

From the Publishers of Model Airplane News

Radio Control CAR ACTION

THE WORLD'S PREMIER R/C CAR MAGAZINE

47380 Fall 1986 \$2.50
Canada \$3.25

Display until November 6, 1986



Savage Javelin



**Asphalt
Burner**

Wild '32



Dyno!

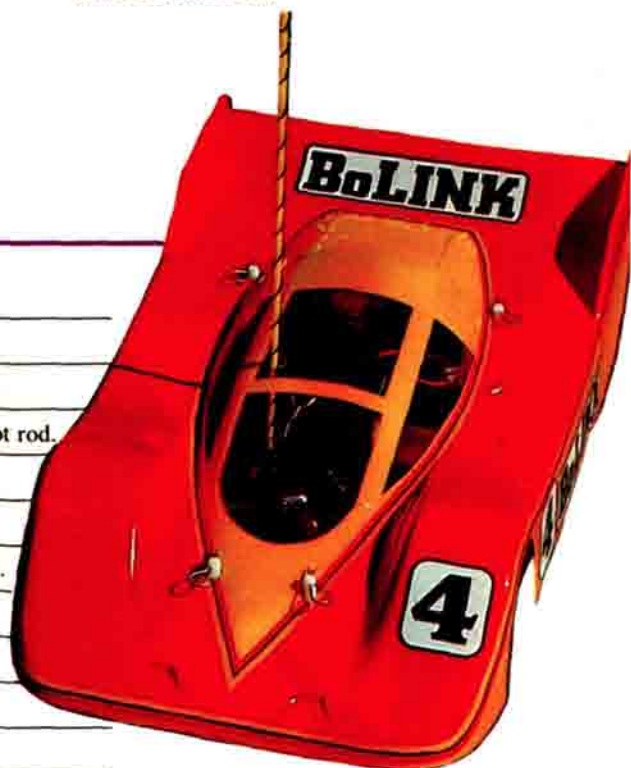
Airbrush Basics



C ONTENTS

Volume 1, Number 4
Fall 1986

ON THE COVER: Shades of R/C hot rodding are evident in this photo of the wild 1/8-scale '32 Deuce built by master designer Gary Conley. Turn to the centerspread where Gary tells you how he built it along with its fully operational supercharged V8. Also on the cover are Kyosho's new 4WD off-road Javelin and a new 1/10-scale asphalt assault weapon which goes by the name of Invader from BoLink. Photos by Louis DeFrancesco Jr.



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Radio Control Car Action (ISSN 0886-1609) is published quarterly by Air Age, Inc., 632 Danbury Rd., Wilton, CT 06897. Second class postage permit pending at Wilton, Connecticut, and at additional mailing offices. Subscription rates are 6 issues \$13.95 (foreign \$18.45); 12 issues \$24.95 (foreign \$33.95). Postmaster: Send Form 3579 to Radio Control Car Action, P.O. Box 427, Mount Morris, IL 61054.

Radio Control CAR ACTION

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SUBSCRIPTION PRICES:

U.S. & Possessions (including APO & FPO):

6 issues \$13.95; 12 issues \$24.95

Outside U.S.:

6 issues \$18.45; 12 issues \$33.95

Payment must be in U.S. funds.

RADIO CONTROL CAR ACTION is published quarterly by Air Age, Inc., 632 Danbury Rd., Wilton, CT 06897. Connecticut Editorial and Business Offices, 632 Danbury Rd., Wilton, CT 06897, phone 203-834-2900. Y.P. Johnson, President; G.E. DeFrancesco, Vice President; LV. DeFrancesco, Secretary/Treasurer. Second Class Postage Permit pending at Wilton, Connecticut, and additional Mailing Office. Copyright 1986 by Air Age, Inc. All rights reserved. ISSN No. 0026-7295.

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ADVERTISING: Advertising rates available on request. Please send advertising materials, insertion orders, etc., to *Radio Control Car Action* Advertising Dept., Air Age, Inc., 632 Danbury Rd., Wilton, CT 06897, phone 203-834-2900.

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POSTMASTER: Please send Form 3579 to *Radio Control Car Action*, P.O. Box 427, Mount Morris, IL 61054.

EDITORIAL

by LOUIS V. deFRANCESCO JR.

I WAS RECENTLY approached by an individual who told me that the R/C car boom is like the slot car boom of the '60s and is just a fad. This unfounded comment by our friend is nothing short of absurd. Slot cars died because you had to bring your car to an electrically-wired indoor track (which were few and far between) to run, and this got boring fast.

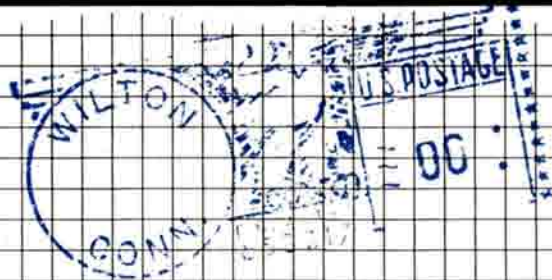
R/C car modeling is the polar opposite. You can run your cars virtually anywhere, you have a seemingly endless array of choices, including on- or off-road gas and electrics, the technology is changing every day, and it's pure three-dimensional fun. Sales of R/C cars and equipment are exploding. Radio control is the future, whether it be cars, boats, airplanes, or helicopters.

Wait until you see this issue. We've got a fantastic article by master painter Phil Soroka on airbrushing Lexan car bodies, there's one on making your car perform better by installing ball bearings, great info about gear ratios, and more on the ultimate R/C model, Gary Conley's 1/4-scale '32 Ford Deuce with a supercharged V8 engine! We featured it in our first issue, but Gary tells all in this follow-up article.

There are a whole slew of new car track reports, including MRC's wild Boomerang, MRP's Pro-110, BoLink's Invader, and many others. Bringing you the latest and the hottest is what we're all about! As usual, your response has been overwhelming, so keep those letters flying in. Anyway, enough talk and on to the good stuff! ■



Letters



Painting Lexan

As a subscriber, I want to tell you right off how much I enjoy this great magazine. It's past due. I'd also like your thoughts concerning paint for Lexan or polycarbonate bodies. In the article in the spring issue the author mentioned several types of paint. However, he did not mention the epoxy paint made by Coverite (Black Baron). Nor did he mention the Pactra Formula U paints. I have used these paints for Lexan and polycarbonate with great success. Is there some shortcoming of these paints of which I am not aware? I'd be most interested in your comments.

ARTHUR M. CASH
Chamblee, Georgia

The polycarbonates were designed to flex with the pliable Lexan bodies and hence chip less. See the article on airbrushing Lexan bodies in this issue.

LVD

Being a leader in the R/C industry, we at Parma were impressed with Mr. Hemstreet's article, "Painting Lexan Bodies" in the Spring 1986 issue.

Unfortunately, Mr. Hemstreet failed to mention Parma's paint in his article. For his and your knowledge, Parma's paint has been on the market for 10 years and is the most widely used paint for Lexan bodies. Perhaps in a future article these facts could be mentioned.

TIMOTHY LORENZO
Marketing Manager
Parma International Inc.

More Compliments

I went down to my local hobby store about a week ago. I was looking at the new shipment of R/C cars when your magazine, *Radio Control Car Action*, caught my eye. I flipped through the pages until I saw the perfect R/C off-roader—the Cox Turbo Scorpion. Thanks to your

magazine, I've finally decided, after four months of careful consideration of every car I've heard of (except for the ones in your magazine), which radio-controlled car is the most suitable for me. Thanks a lot.

BRYAN CLIFFORD
Lafayette, California

We can help you with many decisions!

LVD

I have read both of your issues many, many times, and each time is as exciting as the last. I think a monster truck shoot-out would be excellent.

JOSH ELDRIDGE
Los Angeles, California

We'll get to work on it, Josh.

LVD

I really enjoy your magazine. I have been waiting for a magazine like it and it's finally here. I am 10 years old and I have five cars and am fixing to get a gas car.

CHAD HOWARD
Cullman, Alabama

You have a great magazine! Thank you and keep up the great work.

JEFF SCHEU
Lewiston, New York

What Kind of Radio?

After reading the Spring 1986 issue of your magazine, I decided that the Optima was too good a car to pass up so I started looking for information on where to buy the car and what to buy for it. Unfortunately, my nearest hobby shop knew no such car. So I was stuck wondering whether to buy a four-channel or two-channel radio for the Optima. What do you suggest?

SHAY SABOM
Decatur, Georgia

Shay, a two-channel radio, preferably the wheel type, is all that's needed for the Optima.

LVD

What About Ball Bearings?

I am kind of new to the R/C world. In your magazine I'm always reading about ball bearings as extras for R/C cars. I was wondering where exactly do ball bearings go? By the way, I love your magazine, it's great!

MARVIN ADDISON
Bristol, Virginia

Marvin, we got your letter and decided it was a great idea so we did an article for this issue. We may not be able to respond to all requests this quickly, but we try.

LVD

Comments from Australia

My name is Slade Brice Nelson Yuille, the Public Relations Officer and Vice President of the Deniliquin Model Radio Control Club of New South Wales, Australia. I am writing to let you know that there is a club for remote control personnel in southern New South Wales, Australia, and we'd like it if you could please place our club name in your next magazine as we have just bought your magazine. It has just been released to our town on our request for more information about the remote control scene.

Deniliquin is approximately 500 miles from Sydney and after some inquiries, I have found that our club is the only one of its type for 800 miles around us. We find your magazine to be a very interesting item and we plan to keep buying it so we can put it in our library.

SLADE YUILLE
New South Wales, Australia

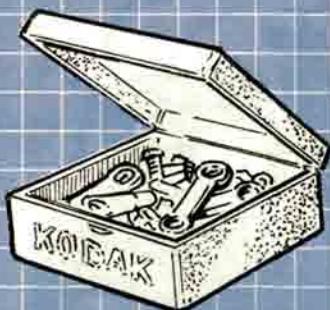
Talk about widely read!

LVD

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Letters," *Radio Control Car Action*, 632 Danbury Rd., Wilton, CT 06897. Letters may be edited for clarity and length.

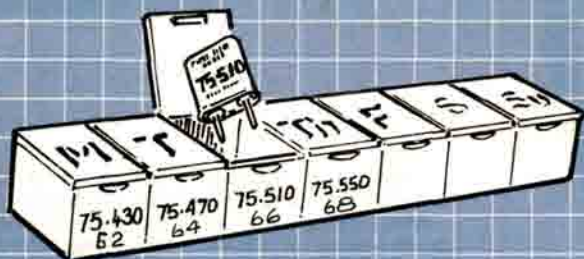
Pit Tips

by JIM NEWMAN



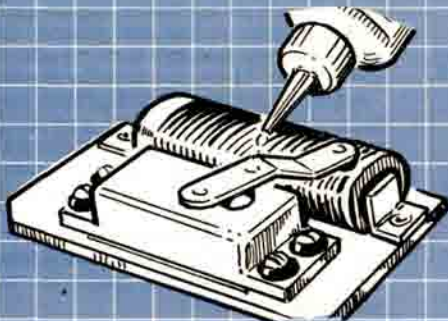
Very handy parts-storage boxes can be found at most photo processing stores in the form of 2x2 slide containers, and you can usually offer to take them off their hands for free! Why not put together a rack from foam board or corrugated card?

Mike Lee, San Diego, California



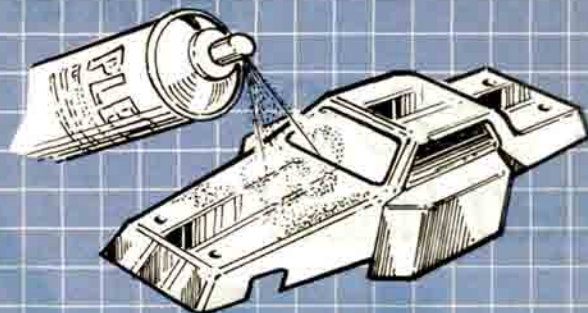
Radio crystals are delicate and easily cracked if badly handled. For maximum protection, store each pair in a seven-day-compartmented pill container, with a little foam or tissue between crystals. These useful plastic containers are at your local drugstore.

Mike Lee, San Diego, California



Does your speed controller display excessive arcing or give erratic power flow? Chances are that you have excessive carbon buildup on the resistance winding and the cure is to apply a drop or two of Pacer Technologies Rail Zip, then operate the speed controller several times. It works like magic and is obtainable from your hobby store—especially those who deal in railroad model supplies.

Mike Lee, San Diego, California.

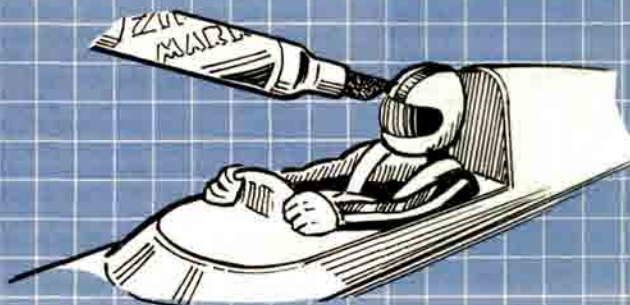


Did you allow paint over-spray to get on the outside of your race car body? Don't resort to solvents which might damage the plastic. Instead, spray on a generous coat of Pledge liquid wax polish, wait one minute, and you'll find the paint dust will easily move with a fingernail or popsicle stick. Buff to a high luster with a soft cloth. We do not recommend using the scented Pledge—others might think your car is a real "lemon"! **David Golden, Temple Hills, Maryland**



Radio receivers can be conveniently mounted using Velcro. Obtainable from any fabric store, it also comes with a self-adhesive back ready to apply each component to the receiver and chassis. To change receivers requires only a quick pull.

Mike Lee, San Diego, California



Here is a quick method of coloring your "driver." First spray him matt white, then use permanent ink markers. These are permanent colors and will last the lifetime of the car. **Caution!** If your car is glo-engine powered, spray a coat of clear urethane or epoxy paint over the ink—glo fuel will smear any markers.

Mike Lee, San Diego, California

Radio Control Car Action will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Pit Tips." Send rough sketch to Jim Newman, c/o **Radio Control Car Action**, 832 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

Track Report



When you positively, absolutely have to race today!

NIKKO RHINO

by CHRIS CHIANELLI

IN CASE you haven't noticed, the R/C car boom has done a great service for *all* facets of radio-control-related hobbies. It's aided greatly in bringing radio-control modeling, as a whole, out of the closet. That fact, whether you want to



An after-market fast charger like this MRC unit is strongly recommended. Who wants to wait until the next day for another run?

admit it or not, is a very good thing. R/C cars such as the Rhino from Nikko America* will only add fuel to this already blazing nation-wide fire.

You see, the Rhino is a pre-assembled, ready-to-go car.

Some people feel that if you don't spend hours and hours toiling on a model, you don't have the right to participate. To that I say, "Nonsense!" There are many people I for one would love to have in the hobby who truly don't have the time to spend. For instance, professionals, traveling salesmen, students, and interns, to name a few. To them I say, "Here's the Rhino! Give it a spin."

THE KIT. The Rhino comes with an installed two-channel radio. All you need to buy are batteries and a charger. The instructions show an overnight trickle charger, but I strongly recommend a fast charger instead. Who wants to wait until the next day for another run? Other features include a thermostat-protected three-stage speed controller (two forward, one reverse), a trailing arm front suspension, a "live" axle swing arm for the rear, friction-dampened shocks (although not oil-filled, these shocks do give some dampening by means of a friction piston), an automotive type differential, and the well-proven Mabuchi RS-540S motor.

The rear tires are soft "knobbies" with ribbon types up front. The entire frame is unitized and fully enclosed to help keep dirt out. The 7.2-

volt battery is accessed from the bottom which is quite convenient. The body comes painted and can be quickly removed with one snap pin.

CONSTRUCTION. This is definitely going to be one small paragraph. The instruction booklet shows you how to screw the antenna into the transmitter, install the antenna tube holder on the car, and install the batteries. The booklet also includes information on charging batteries, how to add optional parts (such as ball bearings), how to operate the radio functions, and spare and optional parts lists. Somehow they managed to get a seven-page booklet out of a car that's already built.

PERFORMANCE. The Rhino is as fast as many other more expensive models which have the same 540S motor. It handles quite well on rough terrain, partly because of the substantial front end suspension travel. On pavement the steering is a bit sensitive but I did get acclimated to it after a short while. This sensitivity is really offset by a comfortable understeer in tight cornering. Many "test crashes" with rocks and curbs left me with the impression that the Rhino is rugged. I was really convinced when my Doberman, Darth Vader, tried to have it for dinner on more than one occasion. And, while having a "Grand Prix" around my brother's pool, the Rhino on two separate occasions did a swan dive into the pool. After I dried it in the sun and cleaned the steering servo pot with denatured



alcohol, the Rhino once again operated perfectly.

All in all, the Rhino, although somewhat out-classed by more expensive cars, is a great entry-level car that can still compete on the track.

The profile of R/C-related hobbies is becoming more visible due in no small part to R/C cars. More and more the average teenager's itinerary includes R/C car activities. For those of you who are tired of looking from the outside in and really want to get involved, no more will you have to say, "If I only had more time," or "only if it weren't so expensive." A car like the Rhino does a lot to strip away these excuses.

The following is the address of the company mentioned in this article:

Nikko America Inc., 851
International Parkway,
Richardson, TX 75081.

The Starting Line

by FRED FISCHER

This question/answer format is designed for beginners and will attempt to answer questions, correct misconceptions, and generally ease entry into the rapidly growing hobby/sport of R/C cars. We welcome your questions, as answers to representative questions will help other beginners. Direct your questions to Fred Fischer, c/o Radio Control Car Action, 632 Danbury Rd., Wilton, CT 06897.

How was your summer? Were you jumping the dunes and flattening the hills with your puddle jumper? Or is the road and track thing your scene?

I've been getting some nice mail, but please remember to include your complete address.

This month let's concentrate on that mysterious beast, the gas car. Although not as popular as electrics, they have been around longer than most electric cars and their popularity is gaining.

Q.

Why should I consider a gas car?

A.

A gas car goes faster than an electric car of the same size. This is because it generates more horsepower per weight than an electric. Let's face it too, some people don't think a model car is all that good unless it sounds like a gas engine running!

Q.

What are some of the accessories I need to buy for a gas car?

A.

I'd suggest getting at least a 1.5-volt battery for the glowplug, a glowplug wire and clip, a glowplug wrench, a manual fuel pump, and a good tool set with screwdrivers and wrenches of different sizes to fit the engine and kit you choose. As you get further into the hobby, a 12-volt battery, a power divider panel, an electric fuel pump, and a 12-volt electric starter with a pulley cone are recommended for ease of operation.

Q.

What kind of kit should I choose?

A.

There are several categories to choose from. Do you like track cars? The $\frac{1}{8}$ -scale is probably the largest category for this size, with everything from sleek Group 5 Porsches, to stock cars, to crazy Corvettes. Buggies your game? Small $\frac{1}{10}$ -scale climbers are around, while giant $\frac{1}{8}$ -scale 4WDs are also tearing up some tracks. Have you seen the roadsters and dragsters in previous issues? The sky's the limit!

Q.

What size engine should I get?

A.

First, read the kit manufacturer's suggestion. Usually, $\frac{1}{10}$ -scale cars use .09 cubic inch to .12 cubic inch (ci = cubic inch) engines, while $\frac{1}{8}$ -scale cars use .19 to .21 ci engines. By the way, engines of this size run on model engine fuel, not gasoline!



Are there any particular types of engines I should buy?



In many cases, you must be careful to choose the right engine for the car. For instance, O.S. Engines manufacture four engines of the .21 ci size. Two of them are side-exhaust engines, while the other two are rear-exhaust engines. This makes a difference in where you will put the muffler in your car. Then there is a further distinction. One each of the side- and rear-exhaust engines are for buggy use and the other pair are intended for track cars. Enya engines only have two side-exhaust .21 engines, but, once again, one is for buggies and the other for track cars.



What's the difference between track engines and buggy engines?



The buggy engines are built for higher torque at lower revolutions per minute (rpm), while the track engine is built mainly for high speed. The buggy engine has to absorb a lot more heat at slower speeds, so maybe the engine has a bigger heat-sink head or it has the mechanics built differently than the track car engine. Many track car engines use a sliding valve carburetor for a more linear throttle response.



Can I put a regular engine into a car?



Maybe you can, but I don't recommend it. Unless the car kit comes with a heat sink to fit the engine, the engine will probably not run right. Most model airplane engines depend on the backwash from a propeller to keep them cool. Since there's no propeller on a car, the engine will run too hot for best performance if you put it in a car.



What type of fuel should I use?



Beyond the engine manufacturer's instructions, I prefer to use low nitro fuel for everyday use. By "low nitro" I mean fuel with a volume content of 5% to 10% nitromethane, with about 20% oil and 70% to 75% methyl alcohol. When it comes to fuel for racing, check the track rules and the manufacturer's suggestions for handling more nitromethane in the engine. However, for fun use I like the low nitro fuel. Engines using this fuel are easy to start, have more than adequate power, and keep cleaner longer.



Speaking about cleaning, how should I maintain my car and engine?



Let's consider the engine first. Don't let raw fuel sit on any surface of the car or inside the fuel tank. Drain the tank dry and wipe the car off with a detergent. Make sure the engine is dry too, and inject some rust-preventative oil into the engine whenever you are done with it.

Q.

And the car?

A.

Like I've said before, keep the gears and rotating joints greased while mildly oiling any bushings or bearings. There is a problem unique to gas cars: the engine itself vibrates a lot. Add the normal shocks that a car will take and you can have loose bolts and screws in a very short time. Keep checking for loose parts every time you run the car.

Q.

All of this sounds like it's difficult to build a good running gas car, right?

A.

Wrong! There are many simple, easy-to-run cars available now. The Kyosho Advance is a rugged performer and is economical to run with an Enya .09 Quicky Buggy engine in the kit box already! Take a look at this and some other kits that are ready to assemble or ready to run, and don't be discouraged.

Q.

Are gas engines easy to start?

A.

Yes and no. Most engines are made to very high standards, so they will start relatively easily if you read, understand, and follow all the directions. However, if you lack an understanding of some mechanics, starting an engine can be a very trying experience. The first time I ever started an engine, it took me three hours before my engine ran by itself! If you can, find someone to help you. You'll get over the rough spots more quickly than I did all by myself.

Q.

Where can I run my gas car?

A.

For 1/10-scale cars, you can use the same areas as for the 1/10 electric cars. The 1/8-scale cars need a lot more room to operate, so you have to choose larger tracks or areas. Keep in mind that your car produces a good bit of noise, just like a lawnmower engine, even with a muffler. Don't aggravate your neighbors by running your car early in the morning or late in the evening. Paying some courtesy to your neighbors might result in them joining you for some fun later!

Q.

Can I use the same radio control for my gas car as I use for my electric car?

A.

In many cases, yes. If you are in the market for an R/C system for your gas car, I suggest you get one with a steering wheel control and adjustable throttle neutral. Unlike electric cars, most gas cars don't have reverse; they have an idle and/or brake position that has to be set precisely for ease of operation. That's where an adjustable throttle neutral setting helps you to get the best throttle control. I like the steering wheel control for surer control of the faster gas cars. If economy is paramount, a two-stick, two-channel R/C system is okay, but it should at least have some means of adjusting the throttle neutral.

Troubleshooting

by FRED MURPHY

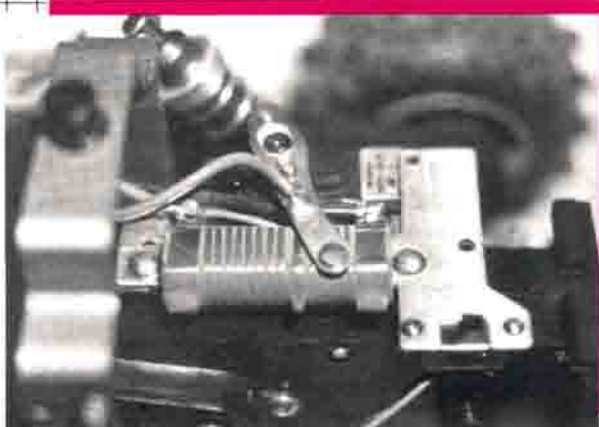
Watch that speed controller

WHEN A CAR hesitates or fails to gain speed, the solution might be in the speed control. First let's take a look at some of the many varieties of controllers available today, with the exception of electronic controllers which I'll discuss at a later date.

The three-step speed controller is just what its name suggests—three steps or three speeds. This unit is commonly found in many of the Tamiya cars and is very reliable, as well as easy to troubleshoot. When installing it, as in all installations, make sure the throttle servo is in a neutral position. Select a servo horn that has a height which will allow the switch plate and servo horn to be as even as possible. If this height difference is too great, a poor contact might develop in the top speed step. Once you're sure you've selected the proper servo horn, set the controller switch blade in the stop position and place the servo horn so it is parallel with the switch blade. Install the servo rod in the first hold position and check the switch stroke to make sure it is not too short or too long. If minor adjustment with your radio's trim control is not adequate, make the adjustment of the servo rod hole position.

Another popular type of speed controller is the variable resistor. This controller has a copper-wrapped ceramic or bakelite plate for a switching plate. This unit is also a very reliable controller, but installation and adjustment must be properly handled to avoid costly problems. When installing the variable resistor controller, make sure, once again, that the servo horn and the switch blade are parallel. Attach the servo rod so that the switch blade and your servo horn maintain this parallel position. Now check controller operation. If the adjustment is not correct, the switch blade will not move all the way to the end of the

Your typical variable resistor speed controller, this one on a Tamiya Frog. This item should definitely be checked often, as it can be the culprit of running problems.



switch plate or will travel over the end; in both cases, problems might arise. Make certain that when full throttle is given with your radio, the switch blade stops on the top speed position or excessive heat generated by the coil might burn out the controller. Final adjustments take only a few minutes and can save expensive components, so take your time.

In addition to the previous types of speed controllers, there is also a racing speed controller. The racing controllers are a little more complex and provide greater braking capabilities, but they will also give your car's motor the utmost power. Many of the racing speed controllers have the switching plate connected directly to the servo horn. The installation key with this type of controller is to make sure the connection

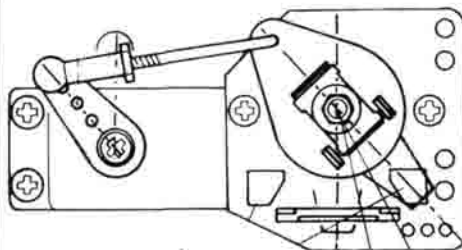
wires are free to move with the servo horn and are not obstructed in any way. If any obstruction does occur, speed and braking capability will virtually be eliminated. Once you're sure the connection wires are free to rotate, make sure the switch blade makes good contact with the top speed position. If it doesn't, loosen the screws in the switching plate and slide the plate until contact is achieved. If your racing speed controller is equipped with coils, the coils might get burnt and its color will change, but this is not necessarily a problem. Only be concerned if the switch blade travel is inadequate, similar to what would happen if your car was equipped with a variable resistor speed controller. If after careful installation of your speed controller the motor still doesn't run at maximum output, press down slightly on the switch as it approaches the top speed position. It might need further adjustment.

Please keep in mind that if there is still no maximum power, you might have to go back to basics and check the heart of your machine, the power source. I'm sure poor battery contacts or just old batteries will be the culprit.

If you have a special area of concern, feel free to drop me a line in care of the magazine, and I'll make every attempt to address your concern in future issues.

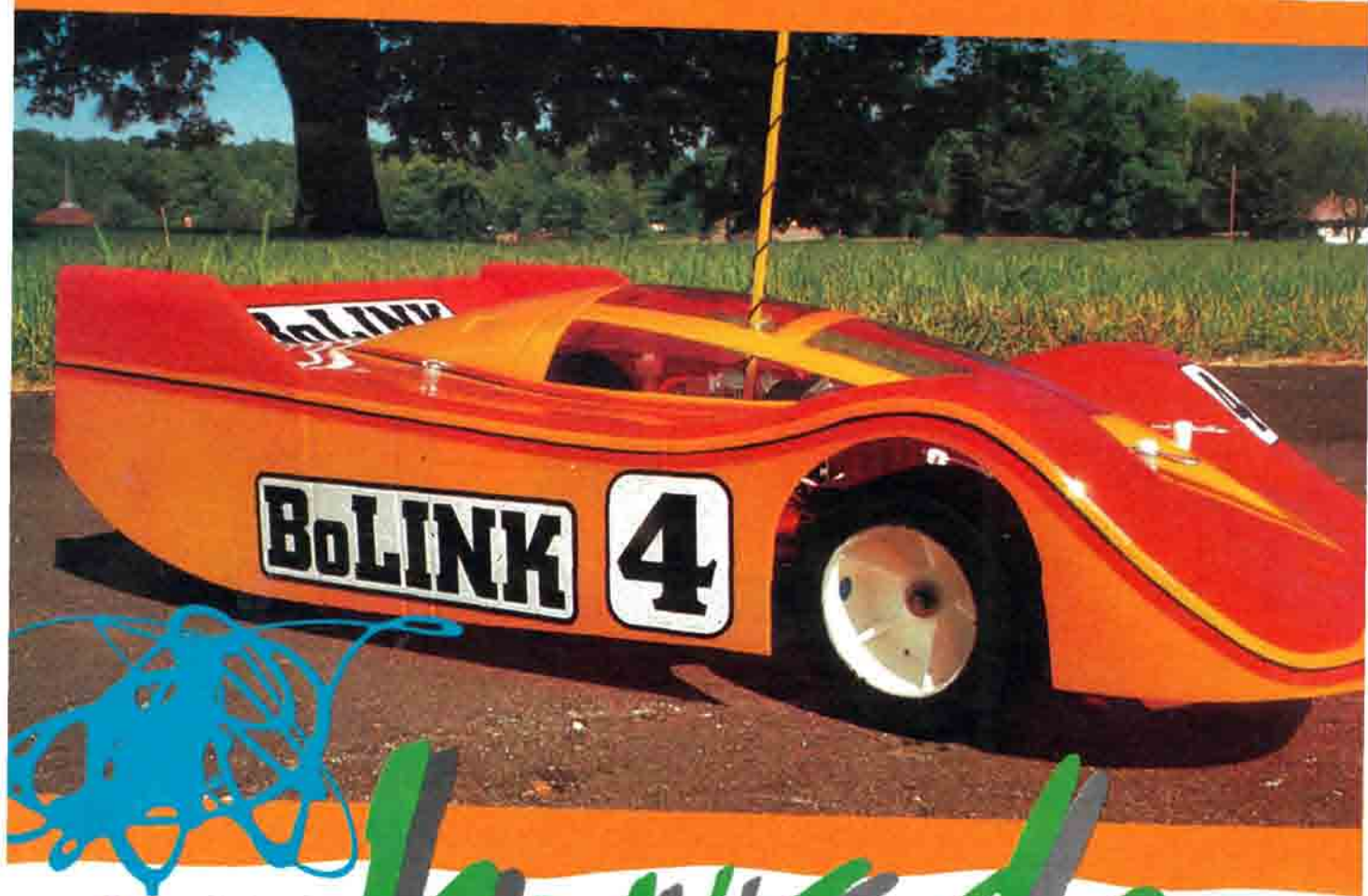
Good luck and happy motoring.

Fred Murphy, c/o Radio Control Car Action, 632 Danbury Rd., Wilton, CT 06897.



Typical three-step speed controller. Illustration courtesy of Tamiya.

Track Report



BoLink

Invader

article and photos by RICH HEMSTREET



*Sure-footed 1/10
pavement prowler.*

BOLINK R/C CARS* is located near the heart of Dixie. Down south, racing means stock cars on dirt bullrings and super speedways, and sports cars running through the streets of Miami and the hills of Road Atlanta. The cars BoLink designs and sells are aimed at their immediate market and the latest BoLink car is the Invader, a 1/10-scale road racer.

THE KIT. The car is packaged in a sturdy, colorful box. The Invader kit has just about everything you need to get on the track. You'll only need to add a 6-cell battery pack and a two-channel radio. I chose to use a Futaba* Magnum Junior with S-32 servos.

A clear Schkee sports racing body is included. The Invader features independent front suspension with separate adjustable coil-over shocks. At the rear a mono-shock keeps the tires on the pavement.



CONSTRUCTION.

The parts are in bags that are numbered to correspond with the step in which they are used. This makes construction much easier, since you don't have to look through all the screws to find the ones to use in a certain step. You have to build the three coil-over shocks, and the oil is included for filling them. It would be nice if manufacturers would list the capacity of their shock absorbers. Then you could use a medical syringe and put in whatever is called for.

The rear axle pod is connected to the main frame by a fiberglass T-bar. The front end has fiberglass swing arms that are connected to the coil-over shocks. When putting the Invader together, be sure to

follow step 2 carefully. The swing arms must move freely on the screws. If they are too tight, be sure to open up the holes as the instructions indicate.

I used an MRC-Tamiya servo

saver on the Futaba S-32. The wire steering linkage is durable and, best of all, it is very easy to set the toe-in. Be sure that the Invader is sitting at the proper ride height when you set the toe-in.

The BoLink speed control is pre-wired; all you have to do is attach a servo to the mounting plate and install the power plug for your receiver. There is even a dropping diode included in the kit.

The differential is the tried-and-true ball type. The instructions include diagrams for both the differential and the wiring. There is also a diagram of the entire chassis assembly that shows all the part numbers. This will be very handy for ordering spare parts.

PERFORMANCE. Building the car went well, but it didn't give me a clue as to how it would handle. I was surprised by the great handling of the Invader. The car has a very low center of gravity and only weighs 3 pounds, which made for a very quick machine.

(Continued on page 102)



A Beginners Guide *Lexan*

by PHIL SOROKA

It's easier than you think to get a winning finish.



Some materials you'll need: airbrush, Fine Line tape, scissors, X-Acto knife, and labels from stationery store for masking tail lights, vents, etc.



Paint used was Parma's Lexan airbrush formula and handy Tamiya paint markers. The '63 'vette' Lexan body available from Parma.



Two sources of air pressure: canned propellant or compressor.

SO, YOU finally decided to try airbrushing a Lexan body. There are two key ingredients for a good paint job: correct equipment and correct materials.

I'll begin with equipment. Badger* makes a fine line of airbrushes for every application. I recommend a single-action airbrush for two reasons: it's a lot easier to use and it's more affordable. Choose one with a medium spray pattern, because it's the most versatile for our type of work.

A compressor is the best source of air, but propellant cans can also be used. You'll also need scissors and X-Acto blades—and *please* use some sort of respirator.

Now for the materials. You'll need paint, thinner, tape, and rubbing alcohol, which will be used for cleaning the body prior to taping and painting. For tape, I found 3M Fine Line tape to be best. It can handle curves and make the sharpest of lines, and it can be purchased at any automotive paint supply store. For paint and thinner, I recommend Parma*. They have a good selection of colors and I've never had the paint flake off.

For this article I chose to use a full-bodied car. The techniques can be used on any body you might choose, but be sure you find a body that fits your chassis. Some bodies are made for a certain wheel base that might not apply to your car. Your best bet is to bring the car with you when you purchase the body. Some bodies also need special mounts, so purchase them when you buy the body.

I believe it's best to cut the body out before you paint. Any paint or fingerprints you might get on the outside



After body is mounted, use paint pen to mark where wheel wells will be trimmed. Always trim before painting.



For best results when taping windows, box them in with half-inch Fine Line tape. Wipe all surfaces to be painted and taped with alcohol.



Detail vents, bumpers, etc., with Tamiya paint pens before painting. Note that use of 1/16-inch Fine Line tape is great for pin striping detail.

Airbrushing Bodies



Practice on paper before you attempt airbrushing. Keep spray pattern uniform and move horizontally back and forth.



After first color is applied, remove tape for second color by pulling it toward itself slowly.



After removing window tape, if any paint seeped under tape, remove it with alcohol and Q-tip.

can easily be removed with alcohol. Remove the antenna and, when using a full body, the front bumper might also have to be removed. Under normal conditions the body will be your bumper.

Now place the body on the car and mark where the body posts and antenna will be, because once it's painted they will be harder to see. To mark the body I found paint pens to work the best. You must do the detail work before painting. They can also be used for detail work, such as for grills, bumpers, and vents, and MRC/Tamiya* has 12 colors for all your needs.

Once you've made the mounting holes, set the mounts for the right height. On the car pictured I chose to use Parma's #10450 mounting kit, which fits a Hornet, a Grasshopper, or an RC10. It comes with everything needed, including body clips. When the mounts are set, mark where the wheel wells should clear the tires.

Now you're ready to cut it out. Cut the bottom body lines out first; I found that 4-inch straight scissors work best for this. To cut the wheel wells, curved Iris scissors are great as they cut curves very easily. They are available at surgical supply stores.

Now that the body has been trimmed, clean the inside with rubbing alcohol and a clean, lint-free rag, such as an old T-shirt.

Next is the taping. Begin with the windows. For best results, box the windows in with 1/2-inch Fine Line tape. Use a new X-Acto blade to cut the tape and use the window line as a guide. Once the windows are boxed in, fill the center with regular masking tape.

When making your design, decide



Materials needed for detailing are Autographics decals, alcohol, and new X-Acto blades.



Completed airbrushed body. Note detail and dramatic color.

whether or not you're going to use stickers. You might have to leave room in certain places for these. They might also help you to choose what colors you want. Autographics* has a fantastic line of stickers and decals.

Once you've chosen your colors, you're ready to mix the paint. It's best to have a separate jar for each color you're using. Parma paint is pretty much fool-proof. Mix it 1 part paint to 1 part thinner.

(Continued on page 79)

1/10+4 Hot Rod



Turn that off-roader into a wild street machine!

by the Radio Control Car Action staff

SO YOU'VE HAD it up to your yin yang with the off-road dirt scene. Your room is full of knobby tires, RC10 and Frog parts, chargers, racing newsletters, tools, and dirt. You might have even picked up a few trophies and plaques from the last few races. Where do you go from here? Well, my fellow R/C freaks, welcome to the latest R/C craze—hot rodding. It's time to assault the asphalt with your 1/10-scale off-roader—with a few minor modifications, of course!

First of all, your Baja body and spiked tires need the "86" treatment. Adios! Then a trip down to your favorite hobby shop or a perusal through any of the major mail-order catalogs and you'll see that companies like Parma* and BoLink* offer some really neat Lexan hot rod bodies, including old

'vettes, a GTO, Mustangs, even ZZ Top's wild '34 Ford Victoria, and others. Radical stuff! Parma has even got a universal body mount kit that makes the transition easy-o! No sweat!

The next department is the tires. Those ungodly spikes just can't hang with the street scene, so it'd be wise to check out Advance Engineering's* or Twinn-K's* line of street slicks. And for the ultimate, Advance Engineering has got some dyno mag wheels for that new cruiser. Pro-Line* also has some nice wheels that might be worth a look.

And from here, the sky's the limit. Airbrush paint jobs, hot Autographics decals, hot motors, drag races—the works! The car pictured above started out as an MRC/Tamiya* Hornet, but now, with a few changes, it's a bitchin' '63 'vette street machine. Street is neat—1/10 street, that is!

*The following are the addresses of the companies mentioned in this article:

Parma International, Inc.,
13927 Progress Pkwy., N. Royal-
ton, OH 44133.

Bo Link R/C Cars, Inc., 420
Hosea Rd., Lawrenceville, GA
30245.

Advance Engineering & Mfg.
Co., 180 S. Highway 67, Unit G,
P.O. Box 766, Woodland Park,
CO 80866.

Twinn-K, Inc., P.O. Box 31228,
Indianapolis, IN 46231.

Pro-Line USA, P.O. Box 456,
Beaumont, CA 92223.

Autographics of California,
1700 14th St., Bakersfield, CA
93301.

MRC/Tamiya, Model Rectifier
Corp., 2500 Woodbridge Ave.,
Edison, NJ 08817. ■

Suspension Systems

by MIKE LEE

Maintenance and troubleshooting.



photo courtesy of TAMIYA

BY NOW YOU should have a pretty good idea of how your suspension system is built, how it works, and how to improve it. In previous issues we've journeyed through these areas and, if you've done your homework, that suspension should be tuned very well indeed.

Now that you've had a few months to not only tune that suspension but to enjoy it too, it should be about time to check it over and maintain that great handling package. As I've said before, keeping things clean helps plenty, but even the most careful driver has to perform maintenance at some point.

Let's look at how to maintain the car from front to rear. We'll not only see how to keep things working well, but how to troubleshoot problem areas as well. If you're ready, let's bring out the tool box and get to it.

First, no matter whether your car is a dirt burner or a pavement rocket, the

suspension is going to be prone to regular use and abuse, and also dirt, dust, grit, and all other objects of foreign debris. All this junk is going to get into the suspension working parts and jam it up or otherwise foul up your suspension until the buildup is so heavy that the suspension quits working.

Your first job is to remove all foreign debris that you can see. This will prevent that junk from getting somewhere that it's not supposed to be. What you can't see, however, can still hurt you.

To really make sure road garbage isn't hanging you up, tear down the suspension components. That sounds pretty awesome, but it really only takes a little time.

Starting at the front, remove the wheels and dampeners. You're likely to find quite a bit of gunk here, normally hidden in the corners and around the axle. The best way to remove this quickly and easily is to take a toothbrush to it. You can't hurt the car no matter how

hard you brush.

A little cleaning solvent wouldn't hurt either. I recommend liquid lighter fluid as a cleaner. It sounds rough, but it works well. It removes old, built-up oils and grease, but it won't harm any of the plastics or the body. Just make sure that you do the cleaning somewhere with plenty of ventilation and away from any type of open flame or ignition source.

Once the wheels, axle, dampeners, and attachment points are cleaned off, look at what you have in hand. You should have the wheels and shocks, plus whatever parts were required to hold them in place. These items require cleaning and a close look-see. Aircraft-type locking nuts might be worn out and that will cause a front wheel to depart at the most unlikely time—like during the mains! When in doubt, throw them out.

Shocks are normally mounted at each end with small rubber grommets. Under severe use, these grommets will wear away and fail. Replace them at the first

Suspension Systems

sign of wear or rotting. If these fail you later on, not only will the suspension get rough, but the dampeners will eventually be destroyed. Pay these little guys plenty of attention.

By the way, if you find that getting replacement grommets is tough, try using the rubber grommets from an extra servo. These are available in a number of sizes and should be easily found in any hobby shop. While you're at it, replace the worn grommets on the servos as well.

Now bring out the shock oil and prepare to get a little dirty. You already have the dampeners off, so why not tear them down and clean them?

If you've kept your assembly instructions from building the car kit, teardown will be no problem. If not, you'll be glad to know that most dampeners come apart by simply unscrewing the top cap.

Once apart, drain all the oil out and look at it carefully. It should be pretty clean and clear. If it isn't, dirt has managed to get in and this dampener will be in need of rebuilding with new seals. See your hobby dealer for the seals and make sure you put it back together right!

That takes care of the stuff in hand, now what about the rest? The rest consists of the suspension arms in the chassis and the chassis itself. These items get dirty and damaged, requiring the home mechanic to perform surgery and maintenance.

Just as you tore down the wheels and



A close look will reveal that this dirt car has a broken anti-roll bar. Small broken items like this will cause even the best suspension system to go askew.



A 1/12 suspension car with a blown front shock. Note the heavy oil leak on end of dampener. It will require rebuilding.

dampeners, it's a good idea to tear down the suspension arms and clean them. Because the suspension arms are normally assembled with steel pins as pivots, they are particularly prone to wear from dirt invading the joints. A little dirt will make the movement stiff. A little more dirt will cause the suspension arm to get reamed out like it was being hit with sandpaper! Once this happens, the suspension arm is history.

Maintenance only requires that you remove the pivot pins and carefully clean out the joints. Use soap and water, and add a drop of oil before reassembly. Make darn sure that any steel pins are completely dry before reassembly. A little rust is as good as dirt any day.

Maintenance of the rear of dirt cars is similar to that of the front, but you'll do well to also inspect the drive axles and cups. Wear and tear can render the smooth universal movement rough and very inviting to wear. What does this have to do with the suspension? Plenty. As the car moves up and down on the suspension, the axles under power must move smoothly within the cups. If the movement is rough, suspension movement will be hindered and degrade even the best suspension setup. Again, in the case of wear on the axles and cups, when in doubt, throw them out.

In the road racing chassis with an upper shaker plate and lower flex chassis, there is a bit different suspension setup. Some of these cars use just the chassis

Upon closer inspection, one can see how dirt can get caught up top of the shocks.



flexing, while others use a small spring to maintain downward pressure, and still others use an oil-filled dampener with spring to take the abuse. Whatever your case, maintenance follows what we have touched on for the dampeners, and a little more for the chassis.

In the chassis itself, one of the most important things to watch for is chassis tweak. The fiberglass chassis of most road cars takes far more abuse than it deserves. What most of us don't realize is that it only takes one shot into the wall to cause the chassis to get tweaked.

"Tweak" is the trick word for the flatness of the chassis. A flat chassis has



Above: When cleaning out dirt, don't forget axles and drive cups. These can deteriorate and cause suspension problems. Right: The bottom of the popular Tamiya Frog reveals dust covers over the axles.

good tweak. A bent one is tweaked. To find the "state of tweak" in your chassis, simply place the stripped-down chassis on a flat surface and look for a little twist in it. It should lie perfectly flat. If it doesn't, straighten it by simply taking a hot air blower to it. Anchor the chassis down enough so that you can grab the other end of it and twist it in the opposite direction. Heat the chassis with the blower gently and evenly, and it will retweak to a flat position. Go slowly and allow the chassis to cool before letting go to check the tweak. No sweat.

One last point on the fiberglass road chassis: look very carefully for hairline cracks at the narrow points. This is where the chassis will flex the most and also where it will break first. If you find any cracks, start thinking about a new chassis. It won't do you or the radio any good if the chassis falls apart on the main straight.

Now for the last portion of our suspension maintenance, the body of the car. Sound strange? Maybe so, but the body



always has and always will play a big part in the suspension handling. I've mentioned before that an aerodynamically-shaped body helps the car hug the road. I've also mentioned that the wing mounted above the body can enhance downward air pressure to assist in cornering. Make sure these items are in good shape. A torn-up body not only looks bad, but can actually cause the car to go more slowly. It can have bent fenders that cup the air and act as air brakes. The front of the car could be bent upward slightly, causing the car to virtually lift off the road surface. And the wing won't move any air if the airfoil shape isn't an airfoil any more.

Take care of the body, and replace it when it gets battle scarred. It may even improve the image of the driver.

Well, that's it. You've gone through the entire car and made that suspension work like new, just like it's supposed to. You'll have a car that keeps going fast and feels the same every time you drive it. Proper maintenance can also make that car last many, many miles. It's not hard to do, so get with it. And keep that car in contact with the road.

Mike Lee, c/o Radio Control Car Action, 632 Danbury Rd., Wilton, CT 06897.



This photo demonstrates how a toothbrush can easily remove dirt from a shock.

"Hunter" Off-road Racer!



HLWF001 Hobby Lobby

HUNTER 1:8 4WD OFF-ROAD

R/C GAS RACER\$179.00

Hunter is a 1:8 scale glow-powered off-road racer that is 20" long, 11.4" wide, 6.5" high, weighs 7 pounds (ready-to-race), and has a 13" wheelbase. It requires a .21 side-exhaust car engine and a 2 channel radio. We recommend the Picco .21 or Enya .21.

Hunter comes fully-assembled and you only have to install an engine and radio. It includes a lightweight tuned muffler that's made to duct all the messy exhaust products away from the car. There's a drive shaft (instead of a belt) and a teflon-shoe clutch that's nearly indestructible.

Hunter's top speed is well over 40mph if you can handle it. And if you can't handle it, Hobby Lobby stocks all the replacement parts.

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Basics of Gear Ratios

by RICH HEMSTREET

“WHAT gear are you running?” This is a question heard frequently around R/C race tracks. Let’s take a closer look at gearing.

First I have to place some limits on our discussion. I’ll consider only simple drivetrains that include only two gears: the spur gear attached to the rear axle and the pinion gear attached to the motor. To figure out the gear ratio, you divide the number of teeth on the spur gear by the number of teeth on the pinion (i.e., 48-tooth spur ÷ 12-tooth pinion = 4.0 to 1 gear ratio). The lower the gear ratio, the faster the car will go.

The simplest way to discuss the effects of gearing will be to look at changing only the pinion gear, which is usually the easiest gear to change.

Gearing will affect your racer’s top speed, acceleration, and, with electric cars, your running time. The larger your pinion, the higher your top speed. Everybody agrees with this. Generally, the smaller your pinion, the greater your acceleration will be. There is some debate concerning the effect of gearing as it applies to the acceleration of electric cars. Some say that because an electric motor’s torque is highest at 0 rpm, a car with a large pinion will accelerate more quickly than a car with a smaller pinion. Others disagree. In my own experience, it seems that I always get more acceleration from a smaller pinion.

In electric cars the running time is directly related to your gearing. The larger your pinion, the shorter your running time. If you are not able to make



Top: Note typical spur (large) and pinion (small) gear. Middle: There is a large selection of pinion gears for the desired ratio. Bottom: Pick the gear that best suits your driving conditions.

the full time limit, you can switch to a smaller pinion and run longer. The common advice now given is to gear for time. That is, use the largest pinion gear you can and still finish the race before your batteries dump.

There are two aspects of gearing that have not been addressed. The first is that of using your motor efficiently. If you gear for time, but the motor is never able to wind out at its peak rpm, you’re not using the right gear. If you’re running a 200-foot long road course and your car only reaches top speed in the last 10 feet of the main straight, you are overgeared. Switch to a smaller pinion. It doesn’t matter if you’re geared to run the right amount of time. Your car’s motor should be used to its full potential.

The second aspect of gearing applies to beginners. If you follow the advice of gearing for time, you’re probably going too fast. Can you handle the car at top speed down the straights? How about through the turn at the end of the fastest straight? Do you have to be marshaled there frequently? If you’re having trouble handling the speed, change your gears. Put a smaller pinion gear on to slow the car down. You’ll be able to learn to control the car at this reduced top speed and to become more consistent. You’ll also notice more confidence in using the throttle. As you know you can handle the car at top speed, you’ll be more likely to blast the car through the low-speed portions of the track.

One common mistake that’s made is not being bold enough in the gear changes that you make. In most cases it’s difficult to feel the difference between a 16-tooth pinion and a 15-tooth pinion. If you’re just beginning to sort out the gearing that you want, make at least a 2- or 3-tooth change. Drop from a 16-tooth to a 13-tooth pinion. Once you’re in the ballpark, you can fine-tune your gear ratio one tooth at a time. ■

R/C Electronics

by CHARLIE KENNEY

Polk's Aristocraft- Hitech Challenger 2PX

I SAW THE NEW Aristocraft-Hitec Challenger 2PX radio system at the first Radio Control Hobby Trade Association Show in Chicago last October. Louis Polk of Polk's Modelcraft Hobbies* was very proud of this new system and rightfully so. The Challenger 2PX is a beauty and quite inexpensive.

The unit consists of a pistol-grip transmitter, receiver, two servos, combination car or boat battery pack, switch harness and assorted servo horns, and frequency flag. It arrives packed in a molded styrofoam case and my review system operated on 75.590 MHz, Channel 70 (black-purple).

The Challenger 2PX comes with dry cells—four pen cells for the receiver (6V) and eight in the transmitter (12V). If you want to use individual nickel-cadmium pen cells and have a charger, it's not hard to convert. The transmitter already has a charging jack and you can get connectors at your local hobby store. The Challenger 2PX is available only on the 75 MHz channels in the U.S. It utilizes an AM modulated transmitter and employs a superhet receiver. The system is well constructed and contains some very nice features. Let's go over some of these key features:



Transmitter control positions; servo reverse switches under sliding cover.

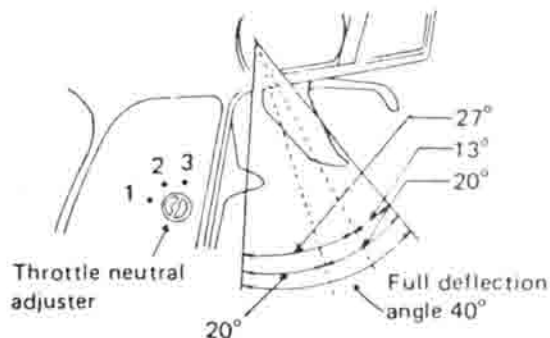
Transmitter HP-2TX75

- Reversible control for left- or right-handed steering.
- Break protection wheel. The steering wheel is now equipped with a new

break the mechanism. (Warning: do not intentionally click the wheel continuously. This may eventually damage the whole wheel mechanism.)

- Steering rate adjuster. The steering servo travel volume (right and left

This drawing illustrates the three different trigger positions.



break-protection mechanism. If you apply more force than necessary, the wheel breaking feature will engage, allowing the wheel to slip rather than

evenly from neutral) can be adjusted simultaneously while running.

- Wheel angle adjuster. The turning angle of the steering wheel can be



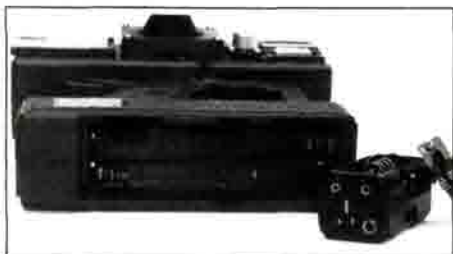
Transmitter front view; battery pack at bottom, antenna storage at top.

increased or decreased. This allows operation at the best angle for the track.

- Neutral adjuster. The throttle trigger is adjustable for throttle/braking (backward and forward stroke) for various applications. (See figure 5.)
- Servo-reversing switch (steering and throttle) is standard. Each servo can be reversed from the transmitter front. This is extremely convenient when connecting the linkages.
- Since a level meter is provided, battery consumption can be monitored continuously.

Receiver HP-2RN75

- Small, lightweight, rugged, and high-performance A/M two-channel receiver.
- New subminiature, highly-reliable pins used at the crystal socket also increase



Complete car system: transmitter, receiver, two servos, and battery pack.

reliability. The crystal can be changed from the outside of the receiver.

- Narrow-band design using a narrow-band ceramic filter resists adjacent channel interference.
- New CMOS miniature IC used in the data coder increases reliability substantially.

Servo HS-402

- Motor uses the newest helical type rotor for improved output torque and smooth operation.



Both transmitter and receiver can use alkaline or nickel-cadmium batteries.

TRANSMITTER

Operating system: Pistol-grip type, two-channel

Transmitting frequency: 75 MHz band—11 frequencies available

Modulation system: AM (Amplitude Modulation)

Power requirement: 12V, AA penlight battery—8 required

Neutral: 1.55 usec

Power output: 500 mw nominal

Dimensions: 6.75x8.50x3.75 inches

Weight: 1.5 pounds (with batteries)

RECEIVER

Receiving frequency: 75 MHz band—11 frequencies available

Intermediate frequency: 455 KHz

Power requirement: 6.0V AA penlight battery—4 required

Current drain: 10 mA at 6 volts

Dimensions: 2.37x1.5x0.75 inches

Weight: 1.5 ounces

Approximate receiving range: 500m on the ground

SERVO (HS-402)

Control system: Positive pulse control (1.55 us) neutral

Operating angle: Rotary system, 45° each side of neutral

Power requirement: 6.0V (shared with receiver)

Current drain: 6.0V, 8 mA (at idle)

Output torque: 42 oz-in.

Operating speed: 0.20 sec/60°

IC: M51660L (306)

Dimensions: 2x0.8x1.9 inches

Weight: 1.7 ounces

- These heavy-duty and water/dust-tight servos are designed for use with Challenger digital proportional radio control sets.
- Strong polyacetal resin ultra-precision servo gear features smooth operation, positive neutral, and very little backlash.
- Special grommet bushing simplifies servo mounting and improves the cushioning effect.
- Four special adjustable splined horns are available.
- Maximum output torque of 42 oz-in. (3 kg-cm) allows use in almost any model.
- High operating speed of 0.20 sec/60° provides superior performance when especially high speed is necessary.

The throttle trigger neutral adjuster can be moved to adjust forward speed and brake deflection for optimum control. Servo-reversing switches for both channels are externally mounted on the top of the transmitter unit. A summary of the salient technical features of the Challenger 2PX are seen in the chart.

Figure 1 shows the placement of parts and controls on the Challenger 2PX pistol-grip transmitter. Let's discuss them in more detail. Starting at the upper left, there is a 7-element telescoping antenna measuring 37½ inches long. The antenna can be unscrewed and stored in a snap holder on the transmitter top. Below the antenna on the left front of the transmitter is a sliding panel containing the Challenger 2PX logo. This moves to the left, exposing the steering and throttle servo-reversing switches. Steering is left

and throttle is right. The down position is normal, up is reverse.

Moving to the right is the steering wheel with its sponge-rubber grip. Below and to the left is the steering rate control. It's a continuously adjustable control to increase or decrease the amount of wheel angle depending on the driving course. Wheel angle control is simply left/right movement of the car's front wheels. It increases or decreases steering depending on direction; clockwise decreases movement, counterclockwise increases movement. It's like a continuously variable dual rate.

In addition, you can also vary steering trim by means of a trim control above the steering wheel. The steering wheel moves the car right when turned clockwise and left when turned counterclockwise. The steering wheel rate adjuster can be moved by your left thumb while controlling the throttle trigger with your left index finger. Needless to say, you steer with your right hand. If you are left handed, the pistol grip can be reversed.

Throttle trim is located to the right of the steering wheel. This control allows you to set the Off position on the rheostat of an electric car or idle on an engine-driven car. To the right of the throttle trim pot you have the On/Off switch; On is to the right and a red band shows when the switch is On.

Above the switch is the battery level meter. When the transmitter is turned On, the meter pointer should register in the green zone. It will move toward the black zone as the batteries weaken. When the needle is in the black zone, it's

time to change the batteries. There's also a red-lined relative power output indicator with a scale from 1 to 10. The numbers correspond to the battery scale below it. At 6, a recharge is in order.

Below the steering wheel is the throttle trigger which is squeezed to increase speed. However, the trigger neutral position for electric cars can be placed in three positions. This throttle neutral adjust control is located approximately two-thirds of the way up the pistol grip and is adjusted with a blade screwdriver. In the full clockwise position, the throttle and brake throws are both 20°. Moving counterclockwise to position 2, the throttle and brake throws are 27° and 13°, respectively, and in position 1, throttle is a full 40°. Figure 5 shows this control movement pictorially.

A charging receptacle is located on the left side of the transmitter base if you want to use nickel-cadmium batteries and a steering tension adjustment is located just above the trigger. At the transmitter rear there are two screws just above the pistol grip that can be removed to allow the pistol grip to be reversed.

The Challenger 2PX is well made, works well, and is available at an attractive price—less than \$65. It has many features of higher-priced radios and helps kids financially to get into this hobby.

Charlie Kenney, c/o *Radio Control Car Action*, 632 Danbury Rd., Wilton, CT 06897.

**The following is the address of the company mentioned in this article:*

Polk's Modelcraft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304.

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Track Report

EPY 17



MRC/Tamiya

Road Wizard

Another first for Tamiya—Formula 1 R/C!

THE MRC/TAMIYA* ROAD WIZARD F-1 is a 1/10-scale model of a Formula 1 racing car. It can be finished in three versions: the John Player Special of the Lotus team, the Williams Honda, and the original Tamiya Road Wizard. The kit also comes with two identical Lexan bodies and three sets of decals, so you can actually swap bodies on the same chassis.

To complete the car you'll need a two-channel radio set, a 7.2V, 1,200-mAh drive motor battery, and polycarbonate paints for your selected color scheme. With my color scheme, the John Player Special, only black and gold were needed.

THE KIT. When the kit arrived, I marveled at the packaging and instruction book. All of the major parts were clearly identified and all of the smaller parts were bagged and identified. The same was true of the various self-tapping and machine screws and nuts. In all, there are over 20 blister pack and packaged bags with parts for the construction of this Formula 1 beauty.

ASSEMBLY. I started on page 1, item 1 of the assembly procedure—the four wheels—by trimming the mold release tangs and then cementing the tires to the rims of the front and rear wheels. From there I proceeded through the 30 steps necessary to complete
(continued on page 38)

by CHARLIE KENNEY



Acoms Technisport AW-75R radio system used in evaluation of F-1 Road Wizard.

Road Wizard

the mechanical assembly and finish the car.

As I said, I elected to do the John Player Special version of the Road Wizard F-1 and it turned out beautifully, even though the decals were a challenge to place.

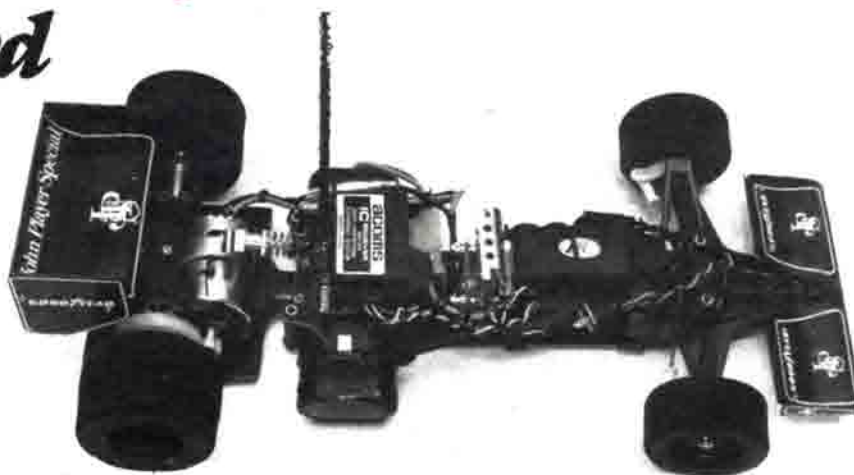
Incidentally, while building this kit I happened to see the full-size J.P.S. race on TV in a Formula 1 race from Detroit. Ayrton Senna of the Lotus team was the driver and he won.

I started the mechanical assembly with the chassis proper, and then assembled the gear case and oil dampener. I followed this by attaching the gear case to the chassis and assembling the differential gear and rear drive shaft. Once this was accomplished, I mounted the drive motor and pinion gear in place. Next, I assembled the upper deck and attached it to the chassis rear. I then attached the front wheel supports, front wheel shafts, and front coil springs to the chassis front.

At that point, the radio set was ready for mounting. I was very fortunate to have the new Altech Marketing* Acorns Technisport AW-75R two-channel radio for this review. Here are some of the "stats" on the AW-75R radio system:

Transmitter AW-75R—frequency, 75 MHz; modulation, AM;

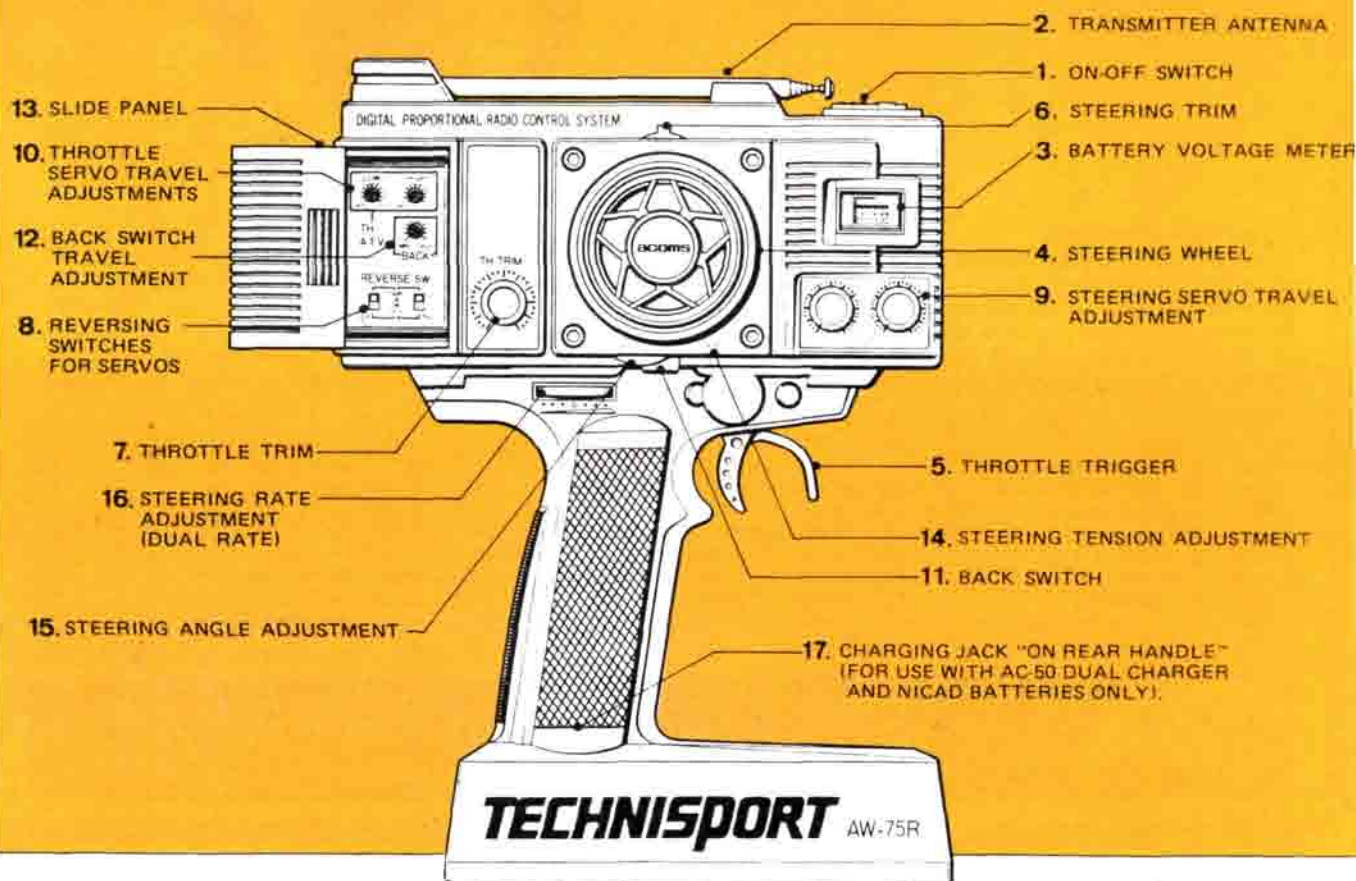
(Continued on page 104)



Complete Acorns AW-75R system installation in Road Wizard. Note separate receiver battery.



EXTERNAL VIEW OF TRANSMITTER / FEATURES OF TRANSMITTER



Handling

by DICK BRINTON

Make your off-roader lean and mean.

MANY YEARS ago there lived a man by the name of Isaac Newton. He was the guy who, legend tells us, was hit on the head by an apple and "discovered" the law of gravity and other laws of motion.

If he were alive today, he probably would be a car designer/builder and crew chief for A.J. Foyt or Bill Elliott or Mario Andretti, because Mr. Newton knew some things about race cars—long before they were even invented.

He compiled a group of facts and put them into formulas, but we don't have to understand the formulas to make the facts work for us.

For instance, Newton said that it takes more force to accelerate a heavy body than it does to accelerate a light body. Think about it for a second. You're sitting in your VW Bug with 60 horsepower at a stoplight next to a 400-hp cement truck carrying 10 tons of concrete. The light turns green and your little VW easily out-accelerates that very heavy cement truck.

If two R/C cars are sitting on the starting line together or coming out of a turn side by side, and they have equal power to the wheels and equal tire bite, the lighter car will get off the line or out of the turn more quickly and accelerate at a higher rate than the heavy car.

Carrying this a bit further, let's take a look at what happens in the curve at the end of the straight. The heavy car is harder to slow down, just as the cement truck is much harder to slow than the



lighter VW. In a race, the lighter car can go deeper into the turn before shutting off and braking. The light car wins hands down.

Okay, but what happens when the heavy car and the light car actually get into the turn? Doesn't the heavy car have "road holding weight," as a major automobile manufacturer stated in one of their ads a few years ago?

Crew Chief Isaac Newton would laugh and reply, "Suppose you roll a beach ball and a bowling ball down a ramp. You can change the course of the beach ball with a light touch but you really have to lean on the bowling ball to get it to change course." Since a curve is a course change, the lighter car will turn more

easily, given the same tire bite, than the heavy car, with less of a tendency to slide or spin out. Since it can change course more easily, the light car also has better ability to avoid the car that spins out in front of it. Weight is so important in full-size car racing that CART, FORMULA 1, USAC, and NASCAR all set minimum car weights that are strictly enforced. Eventually, in order to keep costs down, we'll probably have to do the same thing in our stock classes.

But there's even more to this lightness business. Weight removed from suspension components pays extra dividends!

Find a thin pencil. Grasp it in one hand and shake it as if you were shaking down a thermometer. Note how easily

you can start and stop it. Slip one of your car's wheels (tire and rim) onto the pencil and secure it with a piece of tape. Now try the shake test. The weight of the wheel resists the movement. The pencil and wheel are harder to start and stop, and the heavier the wheel, the more effort the movement requires.

Since bumps cause changes in the direction of the movement of the suspension as in shaking the pencil, it follows that the lighter suspension components will allow the wheels to track over the bumps better. That means they will follow the terrain more closely, which will provide your car with more traction for acceleration, braking, and cornering. In addition, lighter suspension components transmit less jarring to the chassis because the spring and damper can "absorb" the smaller shocks more easily, therefore the car with the lighter weight suspension is more stable.

The easiest way to "add lightness" to your car is to use the lightest parts you can find. Colin Chapman, the designer/builder of the little rear-engine Lotus race car that Jim Clark drove to second place in the 1963 Indy 500—and in the process killed off the heavy front-engine Offy Roadster—used to say if the suspension on one of his race cars didn't break

at least once in normal use each season, it wasn't built light enough.

That was probably a bit hard on some of his drivers but he sure won a lot of races! Now, while you're not likely to hurt your driver, cars that are built as light as possible are not as strong as a stone axe, so they generally require more maintenance and repair.

I suggest you avoid drilling lightening holes in your chassis or suspension components, except for rims. It's very difficult to figure out where to drill for lightness and where you damage handling. It's better to substitute lighter parts. These you can check on a small scale such as you'll find in the local high school science lab. If you don't have access to a scale, you can make a simple one from a piece of wire coat hanger and some string. See the first photo.

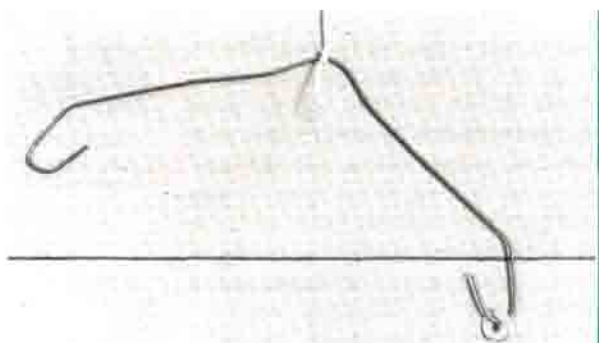
It won't tell you the weight of anything, but you can easily find out which of two pieces is the lightest. Suspend it so it's level. Hang the two parts to be compared, one on each end, and the heavy part will tip the balance just like a seesaw. Mine will indicate a weight difference of less than half a gram. There are 28.4 grams to an ounce.

When it comes to tires and rims though, you can make a lot of difference with a drill bit or two, a set of small side nippers, a number 11 X-Acto or razor blade, and a scale.



ProLine 100F rim drilled for lighter weight.

Easy-to-make yet effective coat-hanger scale.



As our experiment with the pencil shows, heavy wheels—the tire and rim together—are bad news to good suspension but there's another disadvantage to heavy wheels. Mr. Newton called it rotational inertia; big words for an easy concept. Imagine how much more effort it would require to spin a large truck wheel than to spin a bicycle wheel of the same diameter. And to stop the bike wheel you could grab it with one hand. If you really grabbed the spinning truck wheel you'd find yourself turning cartwheels right along with it!

So heavier wheels on our cars require more energy to accelerate, which uses up battery and motor output, and they require more braking power too.

The next photo shows a ProLine 100F rim that has been drilled for lightness. The original rim weighed 13 grams; the



ProLine 102R tires, right one modified for better bite. Note toothpick showing better contact area.

H*andling*

modified one weighs 12.4 grams. That's a savings of 5%. Not bad for five minutes of work. Before you start, test the piece you're going to drill by working it in your hands until you get an idea of its stiffness. Then, after drilling, test it again. If you haven't gone completely crazy with the drill, it should be just about as strong as before—only lighter. The reason this is possible is that manufacturers can't afford to take the time (money) to make everything as light as possible, and remember, it's a lot easier to manufacture smooth surfaces than to make



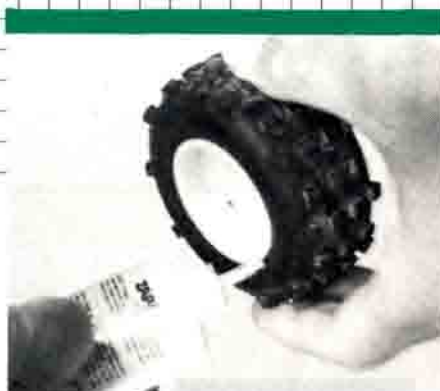
RC10 tires, spikes modified on tire on right.

Swiss cheese.

After you get your car's suspension working to the max (see "Handling, What It Is And How To Get It" in the Summer '86 issue of *Radio Control Car Action*), the change that has the most effect, for better or worse, is tires.

Not only can we improve traction by changing to the correct tires or by modifying them, but look at the difference in weight between some popular ones:

ProLine 104R—47.3 grams—11%
 ProLine 109R—42.2 grams—11%
 Stock RC10 front rim and tire—38.4 grams—7.6%
 ProLine 100F rim and 103F tire—35.5 grams—7.6%



Pacer's Zap being applied to secure bead to rim. Flex-Zap is also very good for this application.

These may not seem like much of a difference, but in a race where you turned 10 laps and the winner turned 11 laps, the winner was only 10% faster than you. *Every* little bit counts.

If you're trying to run all your races on one set of tires, you're not getting the most from your car. No two tracks are alike, and even on your favorite tracks conditions change, sometimes dramatically, even between heats. To be consistent, you have to adjust to these changes with the correct tires. Don't be shy about experimenting, though this should be confined to play days if possible.

Flat track motorcycle racer crews have been modifying tires with a razor for years. Sometimes they achieve truly amazing increases in traction. Of course, sometimes it goes the other way, and there goes an expensive tire. When you experiment, be prepared to pay something for the learning process.

The third photo shows two ProLine 102R tires. The one on the right has been modified to bite better, and in the process it's also lost some weight. Notice how the center spike has been clipped to provide more contact surface.

Last week I was running my RC10 in the open class (21 cars) at the local track. I had some trouble in qualifying as I had lunched my open motor and had to fall back on an Associated Stock motor that had a lot of races on it. I managed to make the B Main but things didn't look too promising. I was down on power to the modified motors that run in this class, so the only place to look was in handling and traction. I went back to a low power suspension setup that I knew

had worked on this track before and then turned my attention to the stock RC10 tires. I modified them by squaring off the front of the spikes. See the next photo. The bite increased and I ended up taking first place in the 7-car B Main. Sometimes it pays to experiment.

Now that you have the best tires and the lightest rims, don't lose your hard-won advantage with improper tire mounting.

Can you imagine the handling problems that occur when a tire pulls slightly off the rim whenever your car slides through a turn? What happens to acceleration if your rear tire slips on the rim when you squeeze on full throttle? If dirt and/or water get into your tire, couldn't they add back all the weight you took the time to pare off? And talk about out of balance. Incidentally, I balance my wheels on a High Point Balancer by drilling the rim or by clipping some of the bead off until the tire/rim is in balance. However, balancing is not so critical on our small cars because of scale effect. I've found that until the out-of-balance gets over about 10% of the wheel weight, it's probably not worth the fuss. I do it because it *was* critical on the full-size cars that I ran. Old habits die hard.

However, tires that are mounted to the rim in a manner that creates a wobble or out-of-round condition can cause some major handling problems. When you let this happen, you're building in your own bumps and erratic steering.

The key to avoiding these problems is proper mounting of the tire to the rim.

First, make sure that your rim is in good condition without cracks. Check the tire to discover any obvious manufacturing defects. Make sure the tire is the correct size for your rim. If your rim is of the three-piece variety, you'll find that the clamping effect is usually quite good, but it's also very easy to mount the

(Continued on page 93)

Track Report



MRP Pro-110

Have dirt—will fly! by MIKE LEE

IN THE rough and tumble arena of off-road racing, it takes a tough car to handle the abuse and come out winning. Many cars have failed to make the cut and the proof is easily seen at the race track. This is what makes finding a good car so interesting. Good cars are few and far between for the serious driver.

The Pro-110 from Model Racing Products* is designed to be a serious off-road car for the sport and serious off-road racer. MRP has been quite successful in their boat models, and their previous cars have enjoyed good success in the sport driving market. With the introduction of the Pro-110, things are definitely getting better for us.

THE KIT. The general makeup of the Pro-110 features a tempered aluminum chassis pan made from T-6 aluminum. Mated to this pan is a fiberglass upper plate, which holds the radio gear and battery. Suspension arms and components are made of engineering Delron 500, a very light and tough space-age plastic. Also included in the kit are full ball bearings for all moving transmission joints and the front wheels, a multi-band ceramic resistor speed controller, a wiring harness, natural rubber tires mated to nylon rims, and a completely illustrated manual with step-by-step instructions.

The manual gives the home car mechanic easy-to-read instructions that are backed by helpful illustrations. They are clear and concise on the assembly, and even feature tips on handling, battery charging, and suspension tuning. In my book, when the instructions are good, you've got more than half the job licked. The kit itself is well laid out, with most components packaged into separate bags for each assembly point. A nice touch is the addition of some extra screws and washers here and there. Good thing, too. This numbed mechanic can lose an elephant on a coffee table. At any rate, you should have absolutely no problem building this one.

ASSEMBLY. Construction of the Pro-110 goes really fast due to the simplicity of the design. Everything in this car was carefully thought out to produce the lowest parts count possible without compromising the design. You'll see how this helps in just a minute.

Starting with the chassis pan, all screw holes are countersunk to allow a clean underside and to prevent undue damage from



screws hanging up on some obstacle on the track. The first step is to mount the front end components to the chassis.

The front suspension consists of a single trailing arm pivoted on a swing arm block from the chassis. Integrated into the front blocks is the front bumper, and the two sides of the blocks key into each other to form a solid front bumper. Rising slightly above the blocks are the shock towers, which are also integrated into the blocks.

Once the suspension arms and blocks are assembled, mount the wheels and shocks. The shocks on the Pro-110 are some of the best I've seen. They're fully adjustable via a small vent screw on the upper portion of the dampener body. The kit provides two bottles of shock oil, in 20 and 90 weights. By mixing the two, different oil weights can be achieved. The shocks are a

medium throw and are equipped with spring coil-overs. Two sets of coil-over springs are provided, allowing you your preference of suspension. It is noteworthy that the springs have been designed to increase their spring rate as the spring is compressed, allowing better overall dampening and preventing bottoming.

At the wheels the Pro-110 is equipped with nylon rims and natural rubber tires. The front tires feature a four-rib, widely-spaced tread design, and are good for sandy and loose soil conditions. The natural rubber provides excellent flex and rebound during cornering and should last a long time. The nylon rims are provided with ball bearings.

Moving to the rear end, you'll find one of the best transmissions on the market. It features only 5 gears from

the motor to the wheels and all are ball-bearing supported. This low number count means that there is less drag for the motor to overcome, which results in more power to the wheels. At the motor, the Pro-110 features special pitch gears which are not only really quiet, but are easy to adjust and make little drag. The kit provides two pinion gears to suit your tastes. The transmission is housed in a cast Delron case, held together with three screws and two bolts. Inside is also the ball type differential. This is adjustable from the outside of the transmission. A simple twist of an Allen wrench is all you need to loosen or tighten the differential.

We are now to the point of mounting the transmission to the chassis, which is accomplished with countersunk screws from the bottom of the

(Continued on page 66)

Track Report

4WD & 4WS for under \$100—
simply awesome!



Royal Ripper

by ART SCHROEDER

WHAT in heaven's name is a Ripper? I wondered. The only "Ripper" I ever heard of was named Jack and he ran around London doing all kinds of weird things. The "Ripper" I found runs anywhere and isn't at all weird in its running. Indeed, it proved to be a very easy-to-build-and-run off-roader. It was Royal Products* entry into the 1/10-scale, off-road derby. And a fine entry it is.

THE KIT. The Royal Ripper is an electric-powered (Mabuchi RS-540S motor, of course), four-wheel-drive, four-wheel-steering vehicle with a pre-painted polycarbonate body and wing. It features four-wheel shaft-drive (no belts), double wishbone suspension with coil spring mono shock, and an adjustable oil damper. The



speed controller has three-speed action, both forward and reverse (though I don't know where you'd use high speed in reverse) and the frame is a rugged ABS resin molding.

Specifications for the car are 16½ inches in length, 9½ inches in width, and 5¼ inches in height. The wheelbase is 10 inches and the car weighs 3 pounds, 14 ounces.

ASSEMBLY. As with all cars I've reviewed, the Ripper comes as a kit of beautifully-finished parts with a superb set of instructions. You might

get tired of hearing me say that, but it's a fact. Just as surely, I will repeat a past statement, "Anyone capable of reading and handling simple tools can assemble this car!" In the case of the Royal Ripper, I did spend a few hours more than past efforts, but that's because it took longer to assemble the

differentials and gear boxes, and a slightly more complex suspension and shock absorbers. Everything fit perfectly and I'll again repeat myself, "If a part doesn't fit—you've got the wrong part."

I strongly suggest that you read the instructions carefully while inspecting the various parts bags, molded parts, and blister packs. This will give you insight into the assembly procedures and parts identification flow. The Royal procedures are different, although very logical and effective.

A new procedure cropped up in step one, which involved boiling certain plastic parts in a solution of water and vinegar. It is claimed that this adds flexibility and strength. The boiling process took three hours and I explained the large pot bubbling away on my stove as an effort to make "plastic soup." No one tried the soup.

I have no idea how effective the procedure is—I've boiled nylon airplane propellers for years so I suspect it really does help. But since I'm not an expert in plastic formulation, I can't say if the procedure works with all high-stress auto parts. Perhaps you readers can provide some insight into this.

One caution I offer for assembling the Ripper is the use of screwdrivers that fit the "Phillips" slots. The metal used on these screws seems very soft and they are easily damaged by the wrong tool.



Model Craft's Pro-Tech Super Charger is not only AC/DC, but supplies trickle as well as fast charging.

The isometric drawings and very clear language make assembly easy and I really can't add much. Just follow them and it's hard to go wrong.

Some beginners might worry a bit about tapping the power supply for the radio receiver directly across a speed controller that utilizes 7.2 volts (most receivers are happy at 4.8 volts). But this is the way it's done on the Ripper and the setup works fine. The arrangement has many advantages: it eliminates a separate battery for the "car-borne" radio, it provides greater "punch" to the servos, and the overall weight of the vehicle is less. Frankly, I don't know why all cars don't include this feature.

Of course, you could worry about losing radio control if the drive battery dies, but I've found that the 7.2-volt battery

stops running the car long before radio control is lost. There is a diode in the speed controller that's intended to eliminate any radio interference from the electric drive motor. Don't worry about being 2.4 volts higher than usual. All receivers I've encountered really work in a range of voltages, and 7.2 volts is just fine.

The Ripper includes a shaft-drive between its two gear boxes which contain differentials. It's a nifty way to go as it eliminates belt drives of any kind. The engineering on this car is super.

PERFORMANCE. Of course any car requires adjustment. The test runs with the Ripper were done with a bit of toe-in on both rear and front wheels. The car responded well and proved to be virtually impossible to spin out, even on the most severe turns. Since I'm not a competition driver, I can't say how the Ripper will do in a real race, but I have a feeling that it could be a winner. It's rugged, fast, and easy to handle. What more can you ask for?

(Continued on page 103)



Airtronics XL 2P was used for control.

Race Track

Make your track top notch.

by MIKE LEE

DESIGN



THE SPORT of model car racing is probably the greatest motor sport/hobby ever, and the hub of the action is found at the track. The race track is where the boasters take on the sly and cunning and find out who has what it takes—and who doesn't!

In the premier issue of *Radio Control Car Action* we brought you our first track design article. That special report told the home-town drivers how to set up their own track and even gave a few pointers on the do's and don'ts. In this report I want to help you develop the track into a raceway that's top-notch and

safe. Come take this tour with us.

In the previous article I mostly worked on the basic design of a new track. I mentioned different obstacles, jumps, drivers stands, and even some dirt compounds. Now I'll talk about dressing it up and keeping the cars on the track.

The first thing you might want to consider is placing a border around the track. You might wonder why you need a barrier at all. After all, who cares if some driver goes off the track and loses time while he tours the countryside? Well, although this might sound pretty good, it doesn't protect the all-important spectators! A runaway car can inflict

some pretty serious injuries on the tender human body. As we all know, an injury can end up being a complaint to the landowner or track manager and cause the track to be shut down. Worse yet, someone might even sue the driver for bad driving habits.

Now you know the biggest reason for the barriers. The other big reason is to be granted an all-important sanction from the governing bodies of model car racing. Both R.O.A.R. and ORCCA require a positive border around the track, which separates the track from spectators and will positively stop any out-of-control car. Remember I said you can make a

track that is good enough to hold a national level race, but not without a barrier around it.

For the off-road track, several types of borders can be used, and the easiest one to make is a dirt berm. The berm is built up to completely surround the track, and then compacted down hard so that it resists breaking down. A berm of this type will stop most normal car mishaps from running off of the main track.

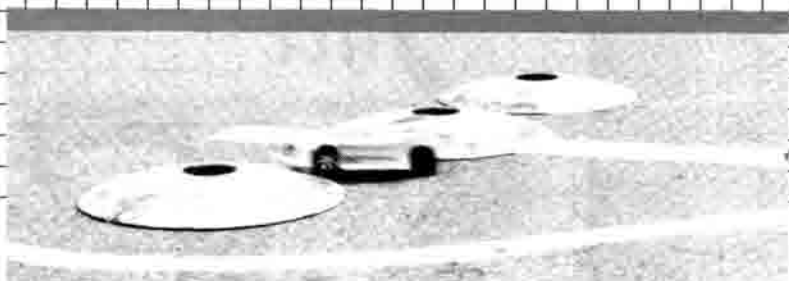
Another type of border is made of plywood. This is the most recommended type because it can be made high enough to not only keep cars in the raceway, but also to keep spectators out. The plywood border is fairly inexpensive and should last a couple of years. One thing to insure



A driver and car jaunt through part of the track. Note the corner dots and fire hose barriers. They make the track safe for both drivers and cars.

is that the plywood is firmly planted in the ground. Leave no holes or gaps between the earth and the wood. Gaps can allow a car to wedge itself in and cause excess damage.

When building up the earth at the bottom of a plywood barrier, try to make a slight curve from the ground to the wood. That will allow any car that comes in contact with the barrier to roll off instead of suffering a head-on crash. Believe me, I've hit enough to know that the plywood doesn't flex much when a dirt-burner challenges it.



Road racer confronts a corner dot due to a driving mistake. Used plow disks like these keep the honest guys honest.

On road courses for asphalt burners, the scene is a little different. It's really not feasible nor desirable to place a dirt berm around the track, but here are a couple of alternatives.

You can use the same plywood type barrier recommended for the dirt track, but, because most of the road courses are located at places that share the asphalt, it's not possible to leave a barrier in place at the track. Your plywood barrier has to be portable. Luckily most of these can be made portable by simply using hardware store items. Door hinges can be used to tie the boards together when set up, and allow them to fold when you're taking them down. Gate straps can also be used by bolting the straps to the boards to tie them together. Unbolt them to take the track down.

Another type of barrier that's effective for containing cars is used fire hose. Yup, the same hose used by every fire station in America. Time will take its toll on this material and eventually the old hose is thrown out. If you go see your local fire department, tell them to throw it your way next time. Fire hose is not only effective at stopping $1/12$ cars from going astray (without damage), but it's also easy to lay down and pick up. For tough areas of the track, the hose can be doubled up with small blocks of wood bolted through two lengths of hose. This makes a tough barrier that will still resist damaging a car.

Another item you should look into to spify up that track is effective corner barriers. Last time I spoke briefly about keeping the honest guys honest by preventing them from cutting corners. Now I want to recommend a few anti-cut devices.

One of the most popular corner guards in use today for the road track is a used plow disk. That sounds funny, but it's very true. Used farm plow disks are

excellent corner guards. They can be bought from local farms at a bargain price. After all, once they're worn out on the farm, the farmer can't do much with it. He might even give them away. The nice thing about these is that they're made in several sizes, just right for most any track.

By the way, the plow disks are pretty heavy, which means that even when Joe-fast-guy hits one dead-on, that disk ain't going nowhere!

Another corner guard you can get cheaply is the standard street dot. This little 4-inch porcelain dot can be found at places where street construction com-



Note how these spectators are protected by two barriers. Any car can inflict injuries, so protection of spectators is important.

panies are found. The going price is about 75 cents each and silicon adhesive keeps it on the ground. These are just right for $1/12$ scale cars. Insure that the edges of the dot join smoothly with the pavement; otherwise, cars with little ground clearance can impact the edge of the dot.

The nicest thing about the street dot is that most landowners won't mind these little guys being placed permanently on the pavement. And, when they are glued down, they won't disappear like so many

(Continued on page 60)

Track Report

MRC / Tamiya

Boomerang 4WD



THE MRC/TAMIYA* BOOMERANG is the baddest off-road, four-wheel-drive machine goin' and you can take that to the bank, or the flats, or the dunes!

This newest Tamiya release should put Model Rectifier Corporation just behind GM and Ford in number of different type vehicles produced. In fact, it may put them in front! Those of you off-roaders who haven't yet tried four-wheel drive will be amazed at this machine. It's pure killer!

THE KIT. The kit contents are nicely packaged and small parts are neatly bagged. The last three pages of the 24-page illustrated assembly manual are a parts list/locator, which makes identifying all the components a much easier task. The illustration even tells you which parts are *not* required.

Assembling your Boomerang doesn't require much in the way of tools; some screwdrivers, pliers, and a hobby knife are what Tamiya recommends. You'll need some Super Glue to anchor the tires to the wheels. I used Pacer's* Flex ZAP, but any of the glues will work just fine. A tube of switch lubricant and oil for the oil-filled shocks are even included in the kit, along with a full sheet of stick-on, thin film decorations to trick out your 'rang.

ASSEMBLY. Construction will take you a couple of

evenings, but goes swiftly due to the great instructions and near perfect parts fit. In order to test the instructions, everything on this kit, except the body painting, was done by my in-laws, George and Wilma Nail. They work well together and were constantly apologizing for taking all my fun away.

We didn't lose any time during assembly and you won't either, if you have your radio available as you're building. Most servos will fit with no problem, but there isn't a lot of room for the battery



One Bad Actor!



pack supplied with the radio. The design of the Boomerang favors the use of the propulsion (7.2V) battery pack to supply both motive power and electronic equipment power. This increases performance by saving the weight of the extra pack and is accomplished by using a Battery Eliminator Circuit (BEC). Order the proper one for your radio equipment unless your receiver already has one.

I used Altech Marketing's* Acoms Technisport AW-75R two-channel radio in the Boomerang and it's the first trigger wheel type car radio I've used; all my other cars have conventional "two-stick" systems. The car-type radio is really the way to go, since it seems more comfortable and the wheel is more realistic to use. This model Acoms has some really nice features, such as servo-reversing and variable-rate servo throw. The grip is even reversible to accommodate us "lefties."

While the Nails were doing the "tough" part, I trimmed the two clear polycarbonate parts (main body and rear wing) in preparation for painting. I washed the parts in warm water and detergent, dried them, masked the windows, lightly sanded them on the inside with 400-grit sandpaper, rewashed and dried them, and was set to paint.

The reason for the light sanding is to create a "scuffed" surface, which allows the paint to adhere better. Since the body is painted from the inside, nearly any kind of paint can be used. It will all result in a deep glossy finish, since you're actually looking through the clear body at the paint. The big advantage is that the finish remains attractive after repeated "bashings," which are likely. I airbrushed the colors (blue and white) in a frosted pattern, applied the stick-on decorations, and attached the body to the chassis that George and Wilma

had already completed. They informed me that they had no difficulty, even though there were two gear boxes to assemble.

They liked the fact that two pinion gears are supplied, a 15-tooth and a 13-tooth, for varying course conditions. Tamiya also offers 14-, 16-, and 17-tooth pinions as options.

They also liked that the three oil-filled shocks are "on car" adjustable for stiffness. They use spacers to vary the throw and compression limits.

RUNNING. When all assembly and painting were done, it was time to head off-road to let Boomerang strut its stuff! George and I headed for my local torture test area, which has relatively smooth but loosely packed dirt. After taking some "pretty" pictures, I briefed George on an imaginary track, which we decided would be good to test the handling of the car. We tried some straight-line acceleration runs and were really impressed, especially since this was an out-of-the-box, non-ball bearing, stock RS-540S-motored kit. It's really neat to see dirt getting sprayed back from each of the four wheels. As impressive as that was, the Boomer really came on when we started doing some tight figure 8s. This maneuver lets you see if your shocks are functioning equally, because you're doing left and right turns (circles) back to back. Even in the loose dirt, it stuck like glue, and kicked up so much dirt that it was frequently obscured by a dust cloud!

After getting used to the car, we found that we could do some of the slickest 180° reversals since those seen on "A Team" by applying full-power reverse when going forward. The final series of tests came over some really rugged, but open terrain. Given enough room for acceleration, the Boomer covers a good portion of the landscape *airborne!*

(Continued on page 93)

'32 Deu



engineering and photos by GARY CONLEY Sandy S

ce



hurlington, Wisconsin

'32 Deuce

by GARY CONLEY

The height of R/C engineering.



WE ALL know, the American love affair with the hot rod has sustained a good 35 years and is likely to continue with fervor. This phenomenon has been so talked and written about that it's now household knowledge. However, there is one make of hot rod that stands out as the queen among the other chosen American beauties, the Ford.

And the premier of the Fords is the '32 "Deuce" roadster.

Many reasons for this have been offered and I'm sure all, in their own ways, are true. Personally, I believe there is also a very strong subconscious national force at work. The '32 Deuce and other Ford hot rods are more than just adored shapes from times past. They are the cars that are strongly associated with the assembly line, which is strongly associated with the Industrial Revolution and the American way of life. This alone is reason enough to build a model-shrine of a national symbol.

The response from the first article on the '32 Deuce in the Winter 1986 issue of *Radio Control Car Action* was so overwhelming that I decided to write a follow-up article. The following is a detailed overview of the 1/4-scale '32 Ford and all its running and control mechanisms.

The car is not small. It measures 39 inches in length, 13 inches in height, and has a wheelbase of 14 inches front and 19 inches rear. At almost 40 pounds, this is a lot of car to start and stop. It took approximately two years of evenings and weekends to build, and I still find areas to change or improve.

The body, frame, and radiator shells are hand-laid fiberglass. Aluminum plates were added to the inside front of each frame rail for added support. The doors are functional down to the latches. Parts like door hinges and latches are all custom-made items. Even the trunk has



carpet and upholstery! The interior is also fully upholstered, down to the kick panels and threshold plates. The switch in the middle of the console is for the operating headlights. Once again, 1/4-scale operating headlights and supports are not available at your local hobby shop. (Speaking of hobby shops, I'd like to thank all the people at Al's Hobby Shop in Elmhurst, Illinois, for all their help in finding some of the smaller parts I needed.) Removing the seats exposes the

electric starter and batteries used for the ignition. The windshield even folds flat. How's that for realism? Next I'll have to build a working cassette player!

A six-channel Futaba radio is used to control brakes, throttle, steering, transmission, ignition, and starter.

The front-end components—dropped axle, leaf spring, and oil-filled shocks—are all hand-forged and the leaf spring I made from strips of metal cut from a hand saw. I then cut these individual pieces to length, rounded off each end, and formed and polished them (not an easy task). The dropped axle started out from a piece of 1/2-inch o.d. rod that I milled in the center to give it an I-beam effect, then heated and formed it. Once the proper angle was formed, I welded the spindle supports and radius rod brackets in place.

The tires are made of solid foam and are glued to the wheels, which are machined from bar stock and sport functional knock-offs—how about that!

Fred Eastman of Eastcraft Specialties supplied the electric starter and also gave me a tremendous idea for a three-speed transmission. He suggested using a slightly modified Schwinn bicycle, which proved quite efficient. First gear has a ratio of 1.5 to 1, second is 1 to 1, and third is 1 to 1.5 to 1.

The rear end, machined from castings, has one-way
(Continued on page 104)

Track Report

Nichimo



Front-wheel drive—the latest R/C technological advancement

S **P** **I** **R** **I** **T**

FOR MANY YEARS, most notable high-performance automobiles sported very large powerplants that were linked to the rear wheels via a transmission and a long drive shaft. This is known as rear-wheel-drive. Within the past decade, advances in technology have given manufacturers the freedom to do away with the drive shaft and the rear differential. Now many of these formidable foes are using their front wheels to get power to the ground. Picking up on this latest trend, Nichimo now manufactures the only front-wheel-drive 1/10-scale off-road racer, the Spirit FF.

THE KIT. This latest creation, imported by Tri-Star Imports*, is yet another fine example of the technological boom in the R/C industry. Aside from front-wheel-drive, the Spirit has many other features, such as oil-dampened coil-over shocks, front and rear anti-roll bars, four-wheel independent suspension, a Mabuchi RS-540 motor with radiator, and a few other hi-po goodies. The kit also includes some special tools and supplies required for assembly. You'll have to supply basic tools, such as screwdrivers, pliers, scissors, and some instant adhesive. You'll also need a two-channel radio, a 7.2-volt

by STEVE POND

photos by LOUIS V. DeFRANCESCO JR.



nickel-cadmium battery, and a battery charger. Although these items aren't needed to begin assembly, it's wise to purchase them when you buy the car. Once you start building this screamer, you won't want to stop.

The guidance system I chose for the Spirit is the new KO Propo Turbo GP competition proportional system marketed by Hobby Shack*. The features of this dynamite new radio include adjustable steering rate, throttle high-point adjust, and brake travel adjust, along with reversing switches for throttle and steering servos. Another purchase you might want to consider is a set of ball bearings and maybe a Kyosho LeMans motor. This combination will make the Spirit a sinister sand-scorching.

CONSTRUCTION. The first of the 49 simple steps is the differential assembly. This (and every other step) doesn't contain much written instruction, but I had no problem with the excellent diagrams provided. Next install the differential followed by the motor. Follow this with the fitting of the front suspension arms, drive shafts, and shocks. After the addition of the steering linkage and various other suspension aids, connect all this to the lower chassis. From here on in it's all downhill.

After bolting on a few accessories, such as the bumper, battery door, and motor radiator, tackle the rear suspension. This is extremely simple because there are no drive components; they're all in the front. Once this is complete, install the radio. The Spirit comes with an On/Off switch and a voltage regulator, which eliminates the need for the switch and battery harness included with your radio. The instructions require that you cut the plug from the radio switch harness and connect it to the switch/regulator included in the kit. This doesn't require a lot of skill, but, if it's possible, solder the connection before applying the heat-shrink tube. If you don't know how to handle a soldering iron, don't attempt this yourself. After completing the radio



Left: No rear drive train on this unique front-wheel-drive. Below: Radio used was the new KO Turbo GP from Hobby Shack. Transmitter performed very well and is the first of a whole new line.

installation, install the tires, roll cage, and body.

Painting the body is a very simple task. You'll only need some white paint and a little patience, as the rest of the body's coloring comes from the decals included in the kit. Before running the car for the first time, check all the radio functions and check the car for smooth operation on the test stand. Then you're ready to do some trail blazin'.

PERFORMANCE. Living on a beach has always had a positive tingle to it, but I've never used it as much as I do now to test R/C cars. Once again, I walked the beaten path to the waterfront to put the Spirit through the ringer. With three fully-charged battery packs and a fresh set of batteries for the radio, I was ready to give this car the whole nine yards.

As always, I got too impatient to give the car a proper warmup, so I dropped the Spirit to the sand and buried the throttle. The fact that it has front-wheel-drive had temporarily slipped my mind, so when the Spirit began to throw the virgin sand from its front tires, I scratched my head in disbelief. Then it all came back to me. The combination of the Spirit and the new KO Propo radio is something to see.

Due to the front-wheel-drive, the car handles like it's riding a slot car track. It handles just as well as its four-wheel-drive counterparts, but it still retains its two-wheel-drive classification.



The Spirit has no problem in the obstacle department either. Unlike its rear-wheel-drive brethren, the Spirit pulls itself over these demon dunes instead of plowing into them and burying the rear wheels to the axle. You'll also notice the lack of oversteer in tight turns. Because of the front-wheel-drive, the car pulls itself through the turns, providing more stability and traction. It's truly a tremendous advantage over rear-wheel power!

All the way through the third battery pack the Spirit never once faltered. So, if you're still skeptical about front-wheel-drive, give the Spirit FF a try.

*The following are the addresses of the companies mentioned in this article:

Tri-Star Imports, Inc., P.O. Box 11392, Santa Rosa, CA 95401.

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.

Race Track

DESIGN

(Continued from page 50)

other items on the "midnight auto supply" shopping list.

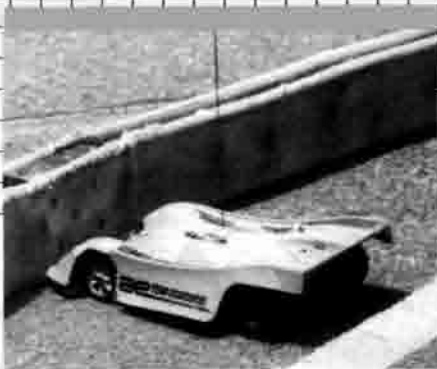
The dirt track can also use help in keeping honest guys honest. Again, fire hose can be effective in stopping corner cuts. Simply bury the edge of the hose into the corner, leaving an upright hose barrier. One or two cars might get by, but they will be far and few between those who make it well enough to continue on. You can make it even tougher by filling the hose with excess dirt or sand. When you do that, there won't be many who will even try to cut across it.

Now how about better traction? Nothing feels better than getting gobs of punch from the track and blowing people away. It's not hard to do for either the dirt track or the road courses.

On the dirt track the best way to add traction is to prevent bad traction. Bad traction results when the surface gets too dry or too hard-packed. A dusty, dry track makes for great rooster tails, but does nothing for traction or handling. The hard-packed track won't allow knobby tires to bite in and the result is a pretty slippery track.

To prevent these conditions, two things are required: a little muscle and water. Watering the track not only keeps the dust down, but it also allows dirt to settle to a soft compound that provides lots of bite. Too much water, however, causes the dirt to settle and that makes the track surface hard when the water goes away. To prevent this you must rake the track to loosen the dirt and keep it from settling. How much water and how much raking will depend on the track conditions. Believe me, it won't take long for you to figure out the right combination of water and muscle.

Be sure and check with the landowner about putting down the stuff I'm going to describe next. It's known as VHT and it's one of the best compounds to put down on a track for additional traction.



Note how this car has impacted the fire hose barrier. This actual crash shows how even a doubled fire hose barrier will not damage a valuable car.

It's an oil additive for full-size cars, it's super sticky, and it's added to the track surface at points where traction is needed, such as normally tight turns and sweepers. The only drawback to using VHT

Then, using a common 5-gallon pump-up bug sprayer, spray the track where needed. Within moments the track gets prime for driving and stays that way for days!

For now these tips should make your track a great place to race. With the design, border, corner guards, and traction tips under your belt, your only



Closeup of a doubled-up fire hose barrier. Note that height is plenty to prevent car from bashing into spectators.

(or similar compounds) is the cost. It can run as much as \$1 per pint. Maybe that's not much for the first can, but add up the cost of how many pints you need per turn and stand back. The cost is substantial.

A second, less expensive alternative is sugar water. A few years ago some guy spilled a soft drink on the track and the place where the spill was just happened to have superb traction. Pretty soon guys were spraying soft drinks all over the track. Personally, I'd rather drink it. Apparently so did the other guys after soft drinks went up in price, so it was soon found that sugar dissolved in hot water worked great. It was good sticky stuff that wasn't overly expensive and it was easy to do. Simply take water and boil it. While it's still on the boil, dissolve about 1 to 2 pounds of sugar per gallon.

chore will be to maintain that great race place. And, believe me, a great race track will become a busy place to be. It's the hub of motor racing activity. Get your track going for you because this is where it's at.

Mike Lee, c/o *Radio Control Car Action*, 632 Danbury Rd., Wilton, CT 06897. ■

Track Report

Kyosho

4 WD

Javelin

From Great Planes Model Distributors



photos by LOUIS V. DeFRANCESCO JR.

by STEVE POND

Savage!



MANY YEARS AGO, a javelin was a long, thin wooden spear. It was used as a weapon to bring home the day's meal or to defend the humble home against a would-be attacker. During recent years the use of the javelin has evolved into a civilized sporting event. The competition revolves around who can throw this spear the farthest. Today the javelin has taken on a whole new form; it has sprouted four spiked, knobby tires, two differentials, and a chain-drive with an electric motor. Although it's competitive like the latter of its two brothers, it still retains a barbaric streak inherited from its oldest brother. This latest Javelin is a killer 1/10-scale, 4WD off-road racer from Kyosho and it's distributed by Great Planes Model Distributors Company*.

THE KIT. The Javelin comes with all running hardware necessary to complete the car, except the radio, battery pack, and charger. The car features a super-strong aluminum ladder frame, oil-filled coil-over shocks on each corner, a fully enclosed chain-drive system, ball-bearing

differentials, and a host of other dynamite features. You'll need a Phillips-head screwdriver, needle-nose pliers, and a sharp hobby knife to put together the Javelin. Other supplies, such as Allen wrenches, lube, and screw-locking adhesive, are included in the kit.

CONSTRUCTION. It isn't necessary to go through a construction treatise on the Javelin because the instruction manual explains each step in such detail that it's virtually impossible to make a mistake. Also, there's a review on the Kyosho Optima in the Spring '86 issue of *Radio Control Car Action* and the Javelin uses almost the same instructions.

Although the instructions are great, I'll give you a few pointers to make the operation go a little more smoothly. Follow the instructions very carefully because if you miss a step you could find yourself taking apart the car to fix it.

I chose the Kyosho 7.2-volt, 6-cell racing pack battery and the Kyosho auto charger with Delta peak shut-off to charge the battery to 100% capacity. For radio transmission, I chose the economical Futaba* FP-T2L

(Continued on page 103)

MRP PRO-110

(Continued from page 44)

chassis. At this time, you're faced with one of the kit options. The Pro-110 can be configured to run a rear-motor or a mid-motor position transmission. The rear-motor position is advisable for the novice driver who will want the car to handle gently and forgivingly. A mid-motor position will better suit the experienced driver and allows the Pro-110 much quicker handling response, but less gentle stability on the track. I made my Pro-110 into the mid-motor configuration, thinking of numb-thumbs might have the experience to handle it.

Once you've chosen the motor position, mount the rear suspension arms.

Like the front arms, these are also single trailing type arms of Delron plastic. They are well gusseted for strength, and ball bearings are present where the axles ride. Single spring progressive dampeners are mounted to the swing arms, and these attach to the shock towers mounted just slightly forward of the swing arm. This arrangement allows a longer arm movement with effective dampening.

The axles on the Pro-110 are case hardened dog-bone types. Only the drive pins are separate from the dog-bone construction, making a very strong axle. In order to keep the dog-bones where they're supposed to be in the roughest terrain, spring tensioners are inserted

into the drive cups at each end.

The suspension arms at the rear are adjustable in ride height separate from the dampeners. Small screws on the bottom of the swing arm are used to limit the swing arm travel to your choice.

The hard work is over and you've now come to the final stretch. Mount the fiberglass upper chassis deck now. The radio equipment and drive battery will mount from this deck. Servo mounting rails and hardware are provided and even large-size servos will fit under the Pro-110 upper deck. The car will easily fit any 6-cell battery pack, and can even fit a 7-cell pack configured to the Pro-110. You can change the position of the battery pack by simply moving the mounting straps, and three positions are already drilled out for you. The straps are quite novel in that they effectively hold the battery tight, yet allow fast removal and replacement. A simple turn of the screw allows this.

A multi-banded ceramic resistor is provided with the Pro-110 for the speed controller, along with appropriate wiring and wipers. There is still plenty of room for the standard 500-mAh battery pack to power the radio, if you want. This would fit easily to the upper deck. Instead, I opted to bypass the radio battery with diode power from the motor battery.

After finishing the radio installation, the final step is to mount the rear chassis stiffener and motor. You now have a finished chassis, but no car is really complete without a good body.

The Pro-110 is furnished with the popular Funco type off-road body made of tough polycarbonate plastic. Actually,

(Continued on page 70)

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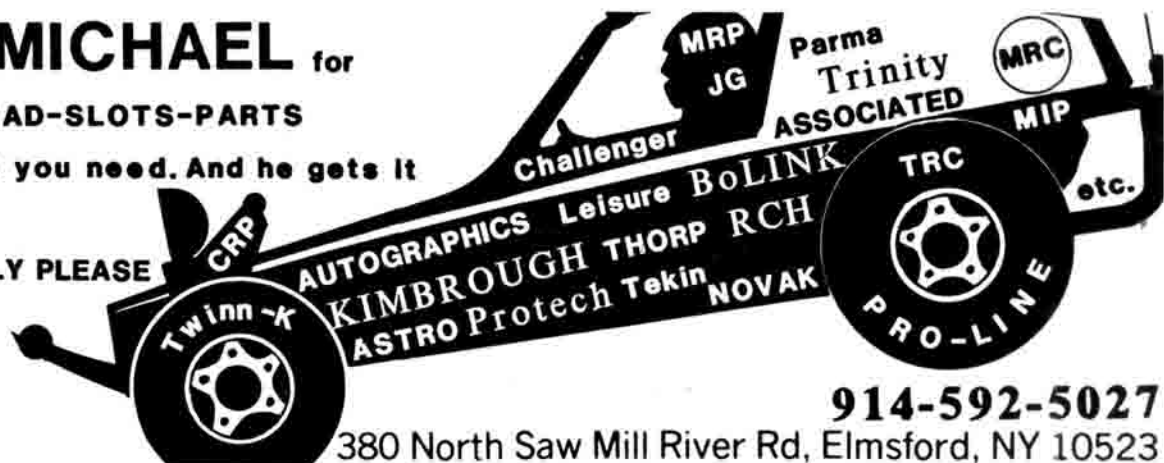
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BEARING UP

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by CHRIS CHIANELLI

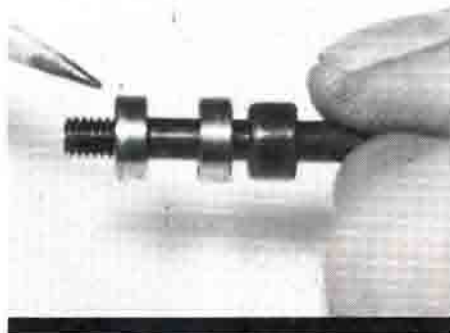
THERE ARE many things you can do to hop-up an R/C car. Equipping your car with ball bearings is probably the one single upgrade that will obtain the most results. The process is not only effective, but it's also quite simple.

Ball bearings drastically cut down on friction in high-stress areas, such as wheel/axle, where nylon bearings really don't cut it in comparison. Other key points on most cars with an automotive type differential are in the gear box. These points are where the universal joint drive units mate with the gear box housing and in the counter gear where it rotates on its shaft. Bearing location will vary slightly, depending on the particular car. For example, my Kyosho Icarus required a total of 12 bearings.

The Icarus was so dirty from continuous use that I decided to give it a complete teardown and cleaning. What better opportunity could I have for installing a set of ball bearings? I had to simply take out the stock nylon bearing

and put in the ball bearing. Many manufacturers give detailed diagrams of exactly where each bearing goes. The ones you see here were taken directly from the Icarus instruction booklet.

As I've said, installing ball bearings, without doing any other modifications, will give you a much more competition-worthy car. Let me just say that the difference on my Icarus was noticeable, to say the least. ■



Wheel axles are high-stress areas and it's imperative that you run ball bearings here.



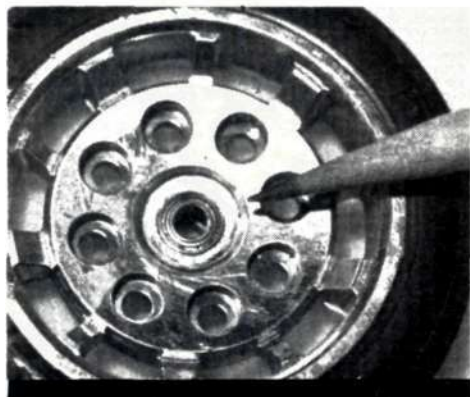
Note new steel ball bearing mounted on outside of wheel.



Above: New axle ball bearing in place. Right: Differential gears are other high-stress areas and need ball bearings for best performance.



Note differential housing on left with new ball bearing inserted, as opposed to old plastic one in housing at right. They just pop in and out.



Note bearing installation on inner wheel.



Ball bearing installation on axle in trailing arm.

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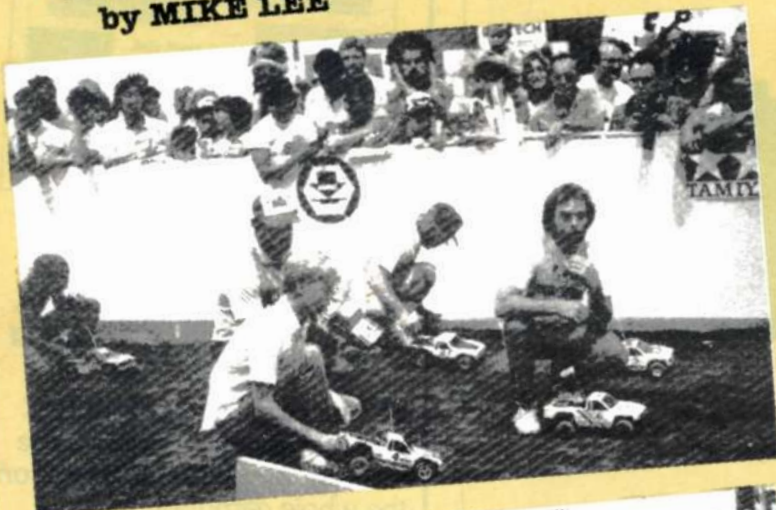
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MRC/Tamiya

Off-Road Champions

by MIKE LEE



Clockwise from top left: Mechanics look to drivers for final nod before leaving cars—good team work. Good view and spacing on the drivers' stand. At only 18, "Jammin'" Jay Halsey is one of the world's best. Track crew giving TLC to track before next round.

THE SCENE FOR THE 5th SCORE-MRC/TAMIYA Off-Road Championships was Anaheim, California, and what a scene it was! This prestigious event has been one of the birthplaces for the off-road racing sport. Indeed, this race has seen the evolution of dirt-throwing from the very start.

The people at MRC/Tamiya conceived the idea for this race to help make the sport grow by exposing model car racing to full-scale off-road enthusiasts at the popular SCORE Off-Road Show and Convention. SCORE is the governing body for full-size off-road racing on the West Coast, responsible for famous

races such as the Baja, the Barstow to Vegas, and the Mexicali.

At the first race, the cars featured were the famous Sand Scorchers, Rough Riders, and F-150 Ford trucks that MRC marketed and blew open the whole sport with. The heats were run based on the first driver to finish the



ships



Right: Tamiya Open Class winners; from left: MRC's Mr. Giacomino; Rick Walton, third; Mike Dunn, second; and Chris Alec, first.



Far left: Tamiya Stock Class winners; from left: Hobie Kaptan, first; Chris Alec, second; and Paul Williams, third. Left: Good clean starting point gave all drivers an equal chance for a good start.



prescribed number of laps. Races that followed were run with 3-minute heats, gut-wrenching (at least for the drivers) 4-minute races, and finally the Open Class races. Each year has given the drivers a bigger and better challenge.

This year's running was no disappointment. Four classes of racing were scheduled; two classes for Tamiya based cars, featuring Tamiya Stock and Tamiya Open, and two other classes—the Two-Wheel Open Class and the Heavy Metal Class. Heats were a standard 4 minutes.

The track itself was a fun track layout. Assembled inside the Anaheim Convention Center just across from Disneyland, the track was a well-cultured dirt-and-turf course. It was bordered with a 4-foot high wooden barrier just outside of a 6-inch wood course barrier. Let's take a tour of the track:

Starting from the back straight, the cars made their starts and headed down about 25 feet of clear track. The first turn was only a slight right curve, but headed right into the main stadium jump. The right line took drivers straight off and over, a slight miss sent them tumbling. Just over the jump was a hard left

turn, followed by turn three, a half-rounded 180° sweeper. Blasting out of this, there were only 8 to 10 feet before a hard right followed by the left of turn five; this had cars sliding. Drivers had to blip the power and hit the right wheel again for the turn six dogleg and onto the main straight. Finally, there was some room to open up. The straight was about 75 feet of wide-open throttle. Close to the end was a slight right, followed by the hairpin of turn eight.

Drivers launched hard from the hairpin and headed for the high banked turn of number nine. An irritator was only a nuisance on the way there. Cars had to stay wide on the bank and sling-shot down toward the deadly triple jumps. The first jump was the worst, for if a driver dumped it on this one, it would torture him for the other two. Power was

needed to hop at least the first two and then take the third.

After contending with the jumps, one had to hit the brakes hard, blast out of turn ten, a sweeping dogleg, then head for the stadium jump again.

It was a delightful course to drive, with great traction and room to pass. The driving skill required was average to good.

The racing started with qualifying on Friday, June 20. Entry not only got you in the door, but into the best showing of off-road equipment and vehicles anywhere.

First to qualify was the Tamiya Stock Class. This class was limited to any type of Tamiya car currently sold. They came out in force, with everything from early Sand Scorchers to state-of-the-art Super

(Continued on page 84)

MRP PRO-110

(Continued from page 70)

tires than I could handle.

Handling of the Pro-110 is judged as good, with very quick and nimble handling with the mid-engine mounting of the motor. So quick was the steering that I thought the wheel base of the Pro-110 was a bit on the short side. Such is not the case, just plain old mid-point balance. The suspension handled everything I could throw at it without complaint. Lateral balance seemed very good with little tendency to roll over when cornered hard. By the way, a hefty anti-roll bar helps out the front end and is standard equipment.

I felt that I could use a bit wider tire on the rear of the Pro-110, as I experienced lots of rooster tails, but I would rather have seen a bit more forward motion in exchange. Of course, varying track conditions will dictate how much traction is derived from any tire. Nonetheless, the Pro-110 is a delightful car to drive. Handling is very good, response is quick, and the suspension is one of the best.

Are you looking for a few good cars? MRP has the Pro-110 for you. The competition just got tougher.

**The following are the addresses of the companies mentioned in this article:*

Model Racing Products, 18676 142nd Ave. NE, Woodinville, WA 98072.

Polk's Modelcraft Hobbies, 346 Bergen Ave., Jersey City, NJ 07304. ■

AIRBRUSHING LEXAN

(Continued from page 25)

Before you paint, press down firmly on all the tape with your finger to make sure it's not lifting up. Next wipe out the inside with rubbing alcohol to remove any fingerprints and oil.

Now to set the airbrush. When using a compressor, set the psi to about 35. You'll need a test board and newspaper works great. Paint the main color of the car first. Shake that color thoroughly and put it on the airbrush. Hold the airbrush with the tip fully closed about 6 inches away from your test board. Press the air button down and slowly open the tip until you get a spray pattern about the size of a half dollar, which is about the same size as the cap of a Parma thinner bottle. Now move to a clean spot on the board and spray for about 3 seconds. What you're trying to do is set the paint flow as much as possible without causing the paint to run.

(Continued on page 82)

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Also available are the 1/4 scale Pacesetter sprint car (left), and the "Outlaw II" (right).

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The radio I used for my Pro-110 was the popular Challenger II from Polk's Modelcraft Hobbies*. The newest of the Challenger series radios, this model features a newly designed transmitter, all-new receiver, all-new servos, and a transmission on the newer 75-MHz frequencies. Of particular interest to me was the new receiver and upgraded servos. The receiver is now in the mini size bracket, being only about two-thirds the size of previous receivers. A new Molex type connector block is seen on the right side of the radio, and as such will not fit any previous Challenger equipment. The servos are markedly faster and smoother due to an all-new design. Performance of the Challenger II proved to be good and reliable.

DRIVING. As for the moment of truth, it was no disappointment. The Pro-110 has got some horsepower. The transmission with its all-ball-bearing ride provides good, smooth transfer to the wheels. Actually, I had put the smaller pinion gear into the transmission and this allowed the dirt to fly! However, even with the larger pinion gear, I still had more dirt throwing from the rear

(Continued on page 79)

MRP PRO-110

(Continued from page 66)

there are two bodies in the kit; one fits inside the other and acts as a dust cover and radio compartment protective case. Molded into this inner body is the driver

figure to make things look like they should—realistic. I painted my Pro-110 with acrylic lacquer paints and did the final touches with the very attractive stickers included in the kit.

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AIRBRUSHING LEXAN

(Continued from page 79)

Next set up a paint jar with thinner or alcohol. This is to keep the airbrush clean between colors and coats. Before painting, put the airbrush on the jar of thinner and spray to clean it out.

You're finally ready to paint. Without touching the inside, get a grip on the body so that it feels comfortable and you can move it around without dropping it or touching the inside. Get into a position where you have enough slack on the air hose without having it get in your way.

The first coat is the most important one of all. Hold the airbrush about 10 inches away from the body and spray the inside of the body lightly, making sure to get in all the corners. Now let the body dry, which usually takes about 4 minutes.

On the second coat, move in to about 6 inches and spray the body evenly again. Let dry and repeat. Usually three coats is sufficient.

To check, put the body on the floor in good lighting. If you don't see through it, it's done. Don't hold the body up to direct light to check, because you should be able to see through a good paint job when this is done.

When using a light color, such as yellow or orange, you'll have to put a coat of white over it so that the other colors don't bleed through.

Before the second color is applied, clean the airbrush with thinner again. This time, put your finger over the tip and backflush the brush.

When the body is dry, remove the tape with an X-Acto blade. That will be the second color. Lift the edge carefully so that you don't scratch the paint, and slowly pull the tape toward itself. If the first color seeped under the tape you just removed, take a Q-tip dipped in alcohol or thinner, and carefully rub it off.

Apply two or three light coats of your second color, and check the body for coverage again. If you're using a third color, continue the same procedure until the entire car is painted.

Once dry, remove the window taping. If you're not using a driver and don't want the inside mechanics to show, tint the windows with black paint sprayed just as you would the first coat, very lightly but evenly. Now that the painting is completed, let the body dry thoroughly for one half hour.

Wipe the outside of the body with alcohol and a clean rag to remove all over-spray and fingerprints. Be careful not to get it inside the body.

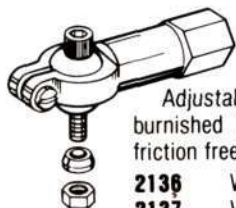
Now is the time to apply stickers. Make sure the body is thoroughly cleaned with alcohol. For best results, use a new X-Acto blade and trim the sticker as close to the edge as possible. Place the sticker on the tip of the X-Acto blade and position it on the body by touching it lightly on one spot to keep it in place. This way, if you decide to move it or it needs to be straightened, you can remove it without ruining it. Once all are in position, rub firmly until all air bubbles are gone. Spray the outside of the body with WD-40 and polish with a soft cloth. This will fill in small scratches and give a nice shine. This also can be done to clean the body after a run.

Don't get discouraged if your first one isn't perfect. The more you do, the better you'll get. Keep it simple at first. Once you gain confidence, you can attempt more elaborate designs and painting techniques. You might even find a hidden talent for painting that you never knew

(Continued on page 84)

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AIRBRUSHING LEXAN

(Continued from page 82)

you had. Look at other cars on the track
or in magazines for designs or color
combinations you like, then go for it!

*The following are the addresses of the
companies mentioned in this article:

Badger Air-Brush Co., 9128 W. Belmont
Ave., Franklin Park, IL 60131.

Parma International Inc., 13927 Progress
Pkwy., N. Royalton, OH 44133.

MRC/Tamiya, Model Rectifier Corp.,
2500 Woodbridge Ave., Edison, NJ 08817.

Autographics of California, 1700 14th St.
Bakersfield, CA 93301. ■

OFF-ROAD CHAMPS

(Continued from page 77)

Shots. Motors were restricted to RS-
540s and 6-cell batteries. Top qualifier in
this class was veteran Tamiya driver,
Hobie Captan. Hobie has driven this
race every year and knows more about
Tamiyas than anyone. Chris Alec was
second fast man.

In Tamiya Open Class, Mike Dunn
put in top time with his highly-modified
Tamiya. Mike has been a top driver for
some time in off-road. Again, Chris Alec
was second fast man. In this class, the
cars started out life as box stock Tamiya
cars and ended up as super-fast Tamiya
killers!

In the Two-Wheel Drive Class, World
Champion driver "Jammin'" Jay Halsey
was the top qualifier. Jay has always
been a tough contender, and is even
today at age 18. Mike Dunn made tough
guy Jay sweat by being second fastest in
qualifying.

The Heavy Metal category is the
newest class. Consisting of any type of
car you want—open motors, 7-cells, and
a truck body—this class was great! Four-
wheelers or two-wheelers sported the big
truck bodies that rattled and flopped,
and added the special touch of fun. The
spectators ate it up.

Top driver in Heavy Metal was the
tough guy again, Jay Halsey. His car was
virtually the same as his two-wheel class
car, only sporting a truck body. Handling
was probably much different. Chris Alec
threatened yet again, with second fastest
time.

One of the nicest things about this
track was the care that went into it, both
when it was set up and when the race was
in progress. Every round had workers
scouring the course to put everything in
tip-top shape for the next round. Real

(Continued on page 91)

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OFF-ROAD CHAMPS

(Continued from page 84)

grass was laid into the infield areas to not only keep down dust, but to present a bit of an obstacle to the cars. It didn't really stop anyone, but it definitely slowed them down. Wood board barriers also kept the honest drivers very honest. These were placed at strategic corners where a driver could easily leap by another driver.

Now for the racing. There was a tremendous turnout for this race, and the mains went from A to H. In Tamiya Stock, the C Main event saw Mike Guterrez battle it out with another contender, until Mike left his opponent behind in a crash just 15 seconds from the finish. Mike took that opportunity to win and bump up to the B Main event.

The B Main saw Devon Dennis take a Tamiya Fox to a clean victory, virtually dominating the field. He took the bump-up and faced off the eight fastest Tamiya Stock drivers in Southern California.

At the start of the A Main, five cars stayed together through the first minute, jumping and sliding together. Hobie Captan, the TQ man, finally broke through the crowd and ran away! Paul Williams and Chris Alec chased hard, but were unable to catch Captan. In the last minute, Alec and Williams had to abandon the chase and fight for second place. While Hobie Captan fed the field his dust, Alec captured second and Williams a close third. For the effort, Captan not only got himself a win, but he got a vacation trip to Hawaii, courtesy of MRC/Tamiya!

In the Tamiya Open Class, I got in with the B Main event. Big Rick Walton, the only guy with the guts and power to drive a truck in this class, proved his mettle and blew away the B Main for a convincing win. He took the bump-up and only a moment later found himself lined up with some tough Tamiya competition. Don Arndt was second in the B Main.

The A Main race promised to be good viewing. About 300 to 400 spectators lined the track to watch the action. They were treated to a spectacular start. Nine cars roared from the line and hit the stadium jump within 2 seconds. Imagine, if you can, nine cars leaping over the main jump, all in less than a second, some hitting in mid-air while others were tromped by cars flying down onto them. Amazingly, Chris Alec survived the airborne attack and jumped out in front. Rick Walton blasted his truck out of the mess and grabbed second place, with

Mike Dunn hot on the trail.

By the halfway point, Dunn passed the truck and started bearing down on Alec. Carl Thompson also started bearing down on Walton's truck and a minute later he took third place from Walton. Alec was being cautious and protecting his lead, and Dunn sensed it. He put the car to the floor, but Alec was not to be denied. With just seconds left,

Alec sprinted and just got by the timing clock as the time expired. That stopped Dunn and a hard-charging Walton who clipped by Thompson for third. Alec took his victory lap with ease and collected a trip to the winner's circle.

In the Open Two-Wheel Class, Tony Rossetti dominated the C Main event and used it for practice for the B Main

(Continued on page 103)

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Contact: Eric Gudger 813-985-6158

Oct. 4-5—GTP only, in Orlando. Contact Jeff Davis 305-273-4015.

Nov. 15-18—CanAm in Jacksonville, Contact Bill Fraden, 904-268-1948.

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Oct. 18—(I-30) 1:00 p.m. time trials, races follow.

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Contact: Howard Finkelman 215-563-4800

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Radio Control Car Action welcomes news of coming events from clubs, organizations, and race tracks. To have news of your next event published free (space permitting), send your name, address, and telephone number along with the date, location, and time of the event, as well as a short description to "Coming Events," Radio Control Car Action, 632 Danbury Rd., Wilton, CT 06897.

HANDLING

(Continued from page 42)

tire off center so that it wobbles or is out of round.

Start by using some lubricant on the tire bead. I use plain soap and water. Fit the inner liner into the tire and carefully slide one of the side pieces into place. Slide the opposite piece into the bead and line up the holes for the screws that secure the rim halves. Insert the screws and fasten the rim together. While the bead is still wet, try to slide the tire on the rim and then try to pull the bead loose. It should be very difficult to accomplish either task. Now make sure your tire is correctly positioned on the rim by installing the wheel on your car and turning it slowly by hand while working at it until it runs true.

If your rim is one of the one- or two-piece variety (or if your three-piece rim won't hold the tire tightly), cyanoacrylate glue is the method I use for securing the tire to the rim. On rear rims where I've managed to fit tires that weren't designed for the rim—usually by cutting off the bead—I back the instant glue with small sheet metal screws inserted through the

rim into the tire. But for most applications, Pacer's Zap does the trick.

First, your rim and tire must be clean and dry. Position your tire correctly on the rim and check it by installing the wheel on your car, turning it by hand and working at it until it runs true. Carefully remove the wheel from your car and hold it tilted at about 70°. See photo. Place a drop of Zap at the top of the bead. It'll wick down the rim and usually seal the whole circumference of the tire to the rim. If not, add a bit more and don't breathe the fumes generated when the glue goes off. Do both beads.

Now retest the wheel. Reinstall it on your car and turn it by hand. Did you get it on so that it doesn't wobble or run out of round?

If not, correct it. No one said getting a race car competitive would be easy! It takes attention to detail because you gain a whole series of small edges which, when taken together, add up to one big advantage.

Stay tuned. See you at the track.

Dick Brinton, c/o Radio Control Car Action, 632 Danbury Rd., Wilton, CT 06897. ■

MRC BOOMERANG

(Continued from page 53)

Nothing seems to stop it. If the tires can bite, it keeps going, often better than some chain-drive 4WDers I have.

This newest Tamiya offering is their best yet and worth its price tag. Performance can be improved by the addition of the optional ball bearings and a number of trick motors, but even in stock form, it's a killer. Tamiya is going to have to go some to top this one.

As much fun as the kit is to assemble, the end of the assembly process is really the beginning of the "big time" fun—the running and racing. I would suggest, however, that you purchase an extra battery pack and a quick charger when you buy your Boomerang—you're not going to want to sit still while waiting for the battery to recharge.

**The following are the addresses of the companies mentioned in this article:*

MRC/Tamiya, Model Rectifier Corp., 2500 Woodbridge Ave., Edison, NJ 08817.

Pacer Technology and Resources, 1600 Dell Ave., Campbell, CA 95008.

Altech Marketing, Inc., P.O. Box 286, Fords, NJ 08863. ■

THE POWER LEVEL HAS JUST ESCALATED TO **FORCE-5**



First, MPE Technologies set the pace with the AVENGER, turning Panasonic power into performance-proven superiority. Then, ROUGH RIDER hit the trail with ground-pounding power in a 4amp/hr. NiCad D-cell pak designed exclusively for 4x4 trucks. NOW, there's FORCE-5 from MPE Technologies. The same sealed lead acid batteries used in the F-18 and AV-8B Harrier II jet fighters comes down to earth in FORCE-5!

FORCE-5 is a D-cell pak producing 5amp/hr. of dense energy, constructed tough like all MPE Technologie paks with super-hard welds and heat and vibration resistant glues. The result is the best energy storage/delivery system available for your 4x4 rig.

If your battery pak's level can't match FORCE-5, pull over, 'cause MPE Technologies is comin' through!

DEALER INQUIRIES WELCOME. CONTACT MPE TECHNOLOGIES, P.O. BOX 280, WILSONVILLE, OR 97070, PHONE (503) 694-5353

MPE
TECHNOLOGIES

What's New

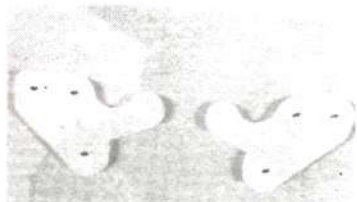
NEW FROM CRP



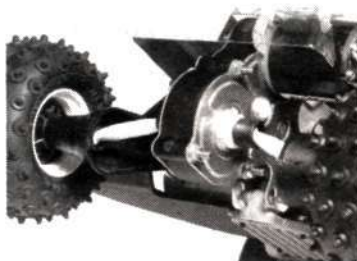
This Grasshopper/Hornet heavy-duty steering (#1604) set gives a much stronger steering rod setup to reduce bending problems.



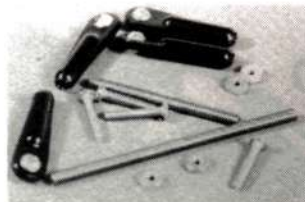
These Frog/Brat rear suspension supports (#1606) greatly reduce the wear factor of the rear trailing arms and give added support and reduce trailing arm flex.



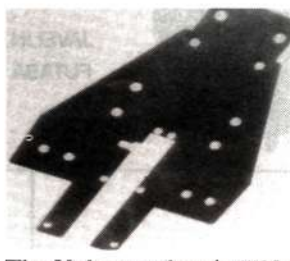
Yokomo front shock mounts (#1546) allow the use of Kyosho shocks on the front of the Yokomo Dog Fighter.



These lightweight injection-molded Frog/Brat axles (#1605) are stronger than stock metal axles and don't wear out the ends as easily.



Replace your steering rods with these Frog/Brat heavy-duty steering 4-40 stainless rods (#1603) and special ends to help end bending problems.



The Yokomo chassis (#10-27) is made of 1/8-inch G-10 fiberglass to prevent flexing.

These and other CRP products are available through Custom Racing Products Inc. (2600 S. California Unit H, Monrovia, CA 91016).

KYOSHO

Precision Ball-Bearing

A complete set for your Optima/Javelin

Size: 5 x 10 x 4mm (10 Pieces)
4 x 8 x 3mm (2 Pieces w/Spacer)

Stock #KYOC2196



KYOSHO introduces hop-up bearings designed for the Opt and Javelin buggies. The complete set includes ten 5x10 mm and 4x8 mm bearings. These high quality, stainless-steel Kyosho bearings are distributed by G Plains Model Distributors (P.O. Box 4021, Champaign, IL 618



ARISTO SPEED CONTROLLER
Aristo has come out with a line of speed controls that are compatible with their radios. They control the speed of the motors by electronically controlling the amount of power that passes to the motor. There are three models available: a 6-10 amp speed control with proportional reverse, a 40 amp speed control without brake, and a 40 amp speed control with brake. For more info write to Aristo/Polk's, 100 Bergen Ave., Jersey City, NJ 07310.

From the Publishers of **R/C CAR ACTION**

Basics of Radio Control Cars



Inside You'll Find...
Building Electric and Gas R/C Cars • Radio Control Electronics • Batteries and Chargers • Painting Accessories • "How To" Modeling Tips • Maintenance • Hopping Up R/C Cars • and much, much more!



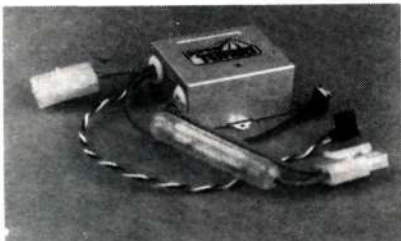
BASICS OF RADIO CONTROL CARS (\$9.99) covers the whole gamut of R/C electric and gas car modeling. By Doug Pratt and the editors of *Radio Control Car Action*, this book includes building, modifications, chargers, R/C electronics, and much more. With the big boom in R/C car modeling, this book comes along at just the right time. To order write to Air Age Publishing (632 Danbury Rd., Wilton, CT 06897) or call toll-free (credit card orders only) 1-800-243-6685.

Descriptions of new products appearing on these pages were derived from press releases supplied by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by R/C Car Action, or guarantee of performance or safety by R/C Car Action. When writing to the manufacturer about any product described here, be sure to mention you read about it in R/C Car Action.

NEW PRODUCTS FROM PARMA



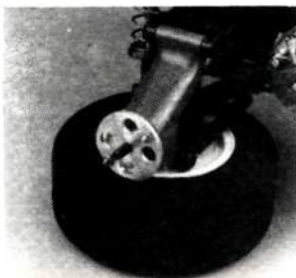
The Parma 12V soldering iron (#13801) delivers 30 watts of power for "at the track" or "in the field" repairs.



The Parma "Turbo" is an electronic speed control available in two versions: the #11520 is the standard unit without reverse and the #11521 is the speed controller with reverse. Both models are designed for 4.8 to 8.4V battery packs.



The Parma Datsun Pick-Up (#10228) is designed as a direct replacement for the Big Bear. Available in clear Lexan it also comes with mounts and instructions. This body was made with the permission expressly granted by Model Expo.



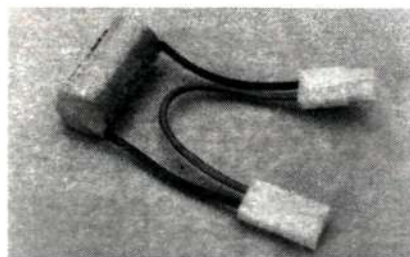
Aluminum front and rear hubs for the Hot Shot (#12109) add strength and durability needed for off-roading.



Parma's chrome wheels (#12105) front (#12111) rear, are a striking addition to 1/10 cars. For a con-course-winning look, try them out!



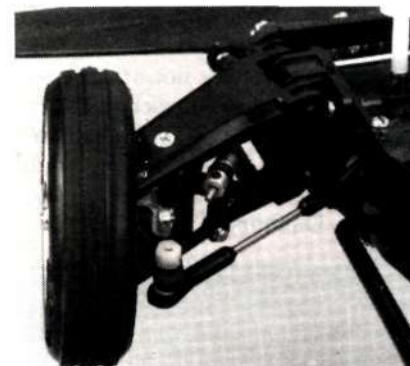
Shielded stainless-steel 5x11 metric ball bearings (#12-300), are available six per bag and are the perfect addition to Tamiya off-road cars.



Parma's 7th Cell Battery (#11235) allows you to convert 6-cell packs to 7-cell very easily. Wired to fit cars using Tamiya plugs, this battery is an easy, economical way to increase the speed of 1/10 cars.



This chopped 1933 Ford 3-window coupe (#10227), available in clear Lexan, is Parma's newest 1/10 body. It has detail that is unmatched!



The Fox heavy-duty tie rod kit (#12829) will be of special interest to owners of this car. When installed, this kit reduces the bump steer by 90°.

Write for more info on these and other products from Parma International (13927 Progress Parkway, N. Royalton, OH 44133).



THE NEW PUMA PRO 21XL Off-Road Racing Car from CMW International (2101 Midway Rd., Suite 250,

Carrollton, TX 75066) has four uses: Four Steering Racing Car; Big Gear Mountaineering Car (gear ratio 1:15); On-Road Racing Car (gear ratio 1:6); and Six Drive Enduring Car (gear ratio 1:9). The Puma is in full steel gear, comes with 19 ball bearings, has a low CG, and a full line of optional accessories. It has straight shaft drive, hard chromium shocks, and disk brakes.

What's New



KYOSHO'S INTEGRA 4WD VANNING is a top-of-the-line, gas-powered off-road buggy. Four-wheel-drive enables it to power its way through dirt, sand, gravel, or mud. Front and rear differentials, double-wish-bone suspension, and knobby high-traction tires keep it under control on corners and in the dirt. The Vanning is distributed by Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820).

SLIP IT is a new space-age lubricant formulated for hobby and home use. A few drops of this product applied to anything that moves will offer a friction-free environment. Use SLIP IT on nyrods, ball links, gears, axles, suspension parts, hinges, shafts, bearings, swivels, retracts—anything that sticks. One application lasts a long time and, because it's not an oil, the treated parts don't attract dust, dirt, or lint. SLIP IT is available at better hobby shops in the U.S. or from Micro Research, Inc. (P.O. Box 2777, Danbury CT 06813).



ROBBE COMPLETE CAR KITS: Robbe (180 Township Line Rd., Belle Mead, NJ 08502) has three exciting new 1/10-scale R/C car kits which include a long list of standard features. Each car can be assembled in one evening.



The Jeep CJ7 Laredo is equally at home on the road or off. It has all the appeal and ruggedness of the full-scale version.



The Mercedes 190 E 2.3-16 is as elegant as the original and the pre-colored injection-molded body eliminates the need for painting.



The Peugeot 205 Turbo 16 is detailed just like the original and is currently one of the most successful rally cars in Europe.



THE ERTL COMPANY (Highways 136 and 20, Dyersville, IA 52040) has three more R/C, full-function vehicles. The five-function Z28 Camaro includes forward, forward right, forward left, reverse, and stop. The three-function Corvette includes forward, reverse right, and reverse left. The four-function Nissan 300ZX includes forward, forward right, forward left, and stop.

NEW PRODUCTS FROM AYK RACING U.S.A.



The Boxer is the newest 1/10-scale R/C off-road racer from AYK. The kit includes the fast and powerful Magnum 360L motor with endbell adjustable timing; newly designed pin spike, low-profile tires; and a glass-filled nylon spur and metal gear combination differential for best results. There are many optional parts.



The TX400F constant current circuit has a peak detector-automatic cut-off charger for 7.2V nickel-cadmium battery packs. It features a protected circuit with reset fuse, a built-in battery cooling fan, and it's lightweight and portable.



The 4x4 Viper is the king of off-road racing. With a "metal beam" monocoque frame, chain drive, and a 4WD system, the Viper also includes two differential gears, four heavy-duty oil shock absorbers, independent suspension, eight ball bearings, and a powerful 360L Magnum motor.

These and other products are available from AYK Racing U.S.A. (P.O. Box 3479, Mission Viejo, CA 92690).



THE O.S. .12 CZ-1 RC ENGINE was designed for R/C "buggy" type vehicles.

The CZ-1 is easy-starting and runs great! It features a built-in heat-sink head, a unique carburetor system, a Schnuerle-porting system, and three ball bearings for improved starting and running qualities, greater durability, and a shorter break-in period. With a displacement of .129 cubic inch the CZ-1 has an rpm range of 3,000 to 20,000. The O.S. CZ-1 Engine is distributed by Great Planes Model Distributors (P.O. Box 4021, Champaign, IL 61820).

NEW FROM MRP



These 1/10-scale off-road tires are used on the new Pro-110 and are molded from real rubber, resulting in superior traction and handling, and longer tire life. These tires will fit RC10s (front rim) or Scorpions (front rim).



The MRP Econocharger is a 12V DC quick charger with a 15-minute sealed timer. An LED light shows when you are charging and it switches to 200-mA trickle charge to peak or maintain your battery pack.



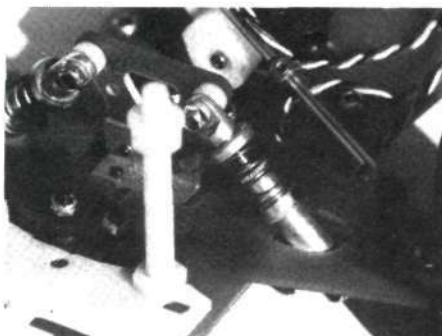
The MRP Econocharger II is a 12V DC quick charger with a 15-minute sealed timer. An analog voltmeter allows you to monitor your pack for peak charging without risking overcharge. It automatically switches to a 200-mA trickle charge to peak or maintain your battery pack.

For more info about these and other products from Model Racing Products write to MRP (18676 142nd Ave. NE, Woodinville, WA 98072).

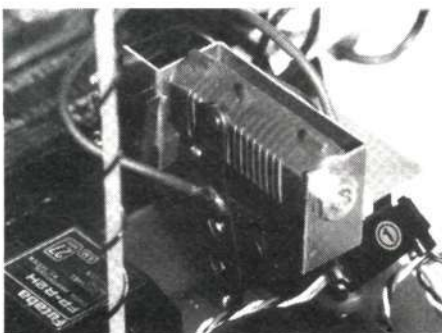
Invader



(Continued from page 21)



Independent front suspension with coil-over shocks.



Neat pre-wired speed control with built-in reverse.



Coil spring on the rear mono shock is fully adjustable.

This car has controlled oversteer. You can kick the rear end out and power slide through a tight turn, but you can't spin out. At top speed on pavement, the Invader would turn very quickly without flipping. The differential worked well; the car went very smoothly through every turn.

According to BoLink's advertising, this car is easily adapted to oval dirt track racing. I put a set of BoLink grooved and cross-cut dirt track tires on and installed a wild-looking BoLink NDRA Firebird body for hitting the dirt ovals. With the new tires installed, I was able to handle hard-packed dirt. The car did have some oversteer, but I controlled that by removing the rear shock and letting the rear end flex freely. On loose surfaces, the front end had too much bite. I think if you installed spiked buggy tires on the rear, you might increase the rear traction a great deal.

As it is, the Invader is a remarkable car that runs great on pavement and very easily handles hard-packed dirt ovals. So, if you're looking for a very good 1/10-scale pavement racer with a split personality, try a BoLink Invader.

**The following are the addresses of the companies mentioned in this article:*

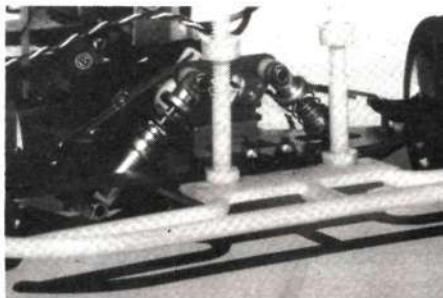
BoLink R/C Cars, Inc., 420 Hosea Rd., Lawrenceville, GA 30245.

Futaba Corporation of America, 555 West Victoria, Compton, CA 90220.

Model Rectifier Corp., 2500 Woodbridge Ave., Edison, NJ 08817. ■



Aluminum motor mount acts as a heat sink.



Full view of Invader's independent front suspension.



Heavy rubber O-rings hold the battery in place.

OFF-ROAD CHAMPS

(Continued from page 91)

event. It wasn't good enough, however, as Chris Alec showed the way through the B Main. Rossetti chased Alec for the first half, but fell victim to traffic. Alec was to try his luck again in the A Main.

These were no easy nine drivers to face. In there were two World Champions, two National Champions, and the rest were at least Regional Champions. Jammin' Jay Halsey looked to be the top seeded driver. He performed!

From the very start, Jay showed the rest why he has won the world title. The car had incredible power and was one of only half-a-dozen cars with enough guts to leap all three jumps of the triples! He actually had to back off the stadium jump to prevent flying past the next turn. Chris Lett tried to chase Jay, but found he had problems of his own when Mike Dunn and Mike Christensen pulled up to challenge. The fight was on for second and third while Jammin' Jay took every line perfectly cautiously. By the 3-minute mark, Jay lapped Dunn and was aiming to lap Lett. Lett stood on it and managed to keep from being lapped while sealing up second place. At the end, Jammin' Jay Halsey was still jammin' in the winner's circle. Dunn was third behind Lett. The rest of the field was left somewhere in the dust.

Now the Heavy Metal Class. In the C Main, Eustace Moore had fun through-out and whistled his way to first and a bump-up. Eustace looked good for the B Main, and so did everyone else.

In the B Main a great race developed between D. Armenteros and Ron Rossetti. These two drivers slugged it out for 3 minutes, trading places all the way for first. Armenteros finally got a break when Rossetti rolled it, only to get the big one! Armenteros hit the stadium jump, but landed hard and lost the right front wheel! That was all she wrote for the car and Rossetti shot by for the win. Eustace Moore trundled by for second.

In the Main event, nine trucks lined up for what promised to be another slug fest. Again, Jammin' Jay Halsey was the top seed. This time, he disappointed! On the very first lap, the truck stalled and left Jay nervously grinding his teeth while pit crew members ripped into the car. Meanwhile, Steve Dunn was out blasting the track with his brother Mike Dunn and Chris Lett breathing down his neck.

Halfway down Gil Losi Jr. let his presence be known as he blasted by everyone to jump into second. Mike Dunn picked up the hint and went

WFO. The racers went at it hard, but time was now against them. At 3½ minutes, Steve Dunn was still leading, with Losi in second and brother Mike in third. Ron Rossetti made one last stab at the lead and managed to make it up to fourth. Too late, however, and Steve Dunn took the checkered flag. Losi was second and Mike Dunn finished third.

What a race to watch. The competition was well matched and exciting. And talk about a perfect place with millions of dollars of dirt-stomping, off-road gear surrounding the track. MRC/Tamiya certainly knows how to do racing, and our hat's off to them. It is off-road racing at the very best it can get, and one that you should be in. I'm eagerly looking forward to next year's event. With a class outfit like this, there's no way to lose! ■

ROYAL RIPPER

(Continued from page 47)

Some of the hotter 540 motors would certainly improve the Ripper's lap times, as would ball bearings on the wheels and

at some strategic drive points. Modified or not, the Royal Ripper gets around rapidly and in good form—a lot better than Jack did I'm sure.

*The following is the address of the company mentioned in this article:

Royal Products Corp., 790 W. Tennessee Ave., Denver, CO 80223. ■

KYOSHO JAVELIN

(Continued from page 65)

two-channel digital proportional radio. It comes equipped with S28 servos and a lightweight two-channel receiver.

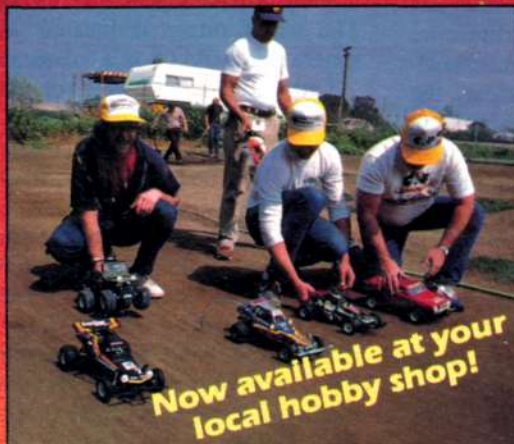
Once the Javelin is finished, there are some other things to take into consideration. The Javelin has adjustable toe-in/out and camber, which could make a very big difference in overall performance. The instructions give you approximate length, but it won't be the same on every car. When the car is complete and the battery is installed, adjust the camber on the front and rear so the wheels are straight up and down when you look at the car from the front.

Basics of Radio Control Cars

An all-new book from the publishers of **Radio Control Car Action**.

by Doug Pratt

The incredible growth of R/C car modeling has created the need for an up-to-date book on the whole gamut of R/C—electric and gas car modeling. Everything from building, modifications, batteries and chargers, to tools, radios, and maintenance will be covered. From beginner to expert, this is the definitive source for the R/C car enthusiast.



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KYOSHO JAVELIN

Adjust the toe-in (only on the front) so the wheels are parallel to each other when looking from the top. If you're not sure about the toe-in/out, give it some toe-in so it has more directional stability.

Kyosho offers a full line of accessories for the Javelin if you want to squeeze more performance out of it. Great Planes included a LeMans 480T high-performance motor with my Javelin, which is a tremendous improvement in itself. Although the RS-540 included with the Javelin is no slouch, the Le Mans 480T will have you waltzing past the competition. Another must for your list of accessories is a ball bearing kit. Bearings reduce the rolling resistance of the car, giving you more running time and reduced wear. Just remember to perform routine inspections and to keep everything well lubricated and you'll find yourself in the winner's circle.

PERFORMANCE. After witnessing the wrath of the Optima, I had a little insight about what to expect from the Javelin. I decided to see how the Javelin would fair with a little competition so I had some friends run worthy competitors from previous reviews. When the flag dropped I gave the Javelin the "lead finger" and it took off like the projectile it really is. Cruising around the track at nearly top speed, the Javelin handled every bump, jump, and turn with no problem except coming into the last turn. I swung a little too wide in the loose dirt, but with the aid of the four-wheel-drive and some hard left rudder, the Javelin gnawed its way back into the groove and shot across the finish line. When the dust settled, the Javelin had a 10-foot lead on its nearest competitor. I guess you could say that the Javelin is capable of turning away the unfriendly visitors and it can also bring home the gold!

**The following are the addresses of the companies mentioned in this article:*

Great Planes Model Distributors Co., P.O. Box 4021, Champaign, IL 61820.

Futaba Corporation of America, 555 W. Victoria St., Compton, CA 90220. ■

'32 DEUCE

(Continued from page 56)

clutch bearings in lieu of differential spiders installed in each wheel and has a final ratio of 3 to 1. In sharp, power-off turns, each wheel is allowed to move independently and locks when power is applied. There are also rear-wheel disc

brakes, oil-filled shocks with heavy-duty coil-overs, and radius rods to support the rear end.

The two-core radiator has top and bottom tanks just like the full-scale. The pressure gauge on top of the radiator is strictly for decoration, but no self-respecting hot rod would be without one.

For the wonder of wonders there's the scale V8. By now most people in the hobby industry have heard that distinct idle of a V8 with a high duration cam and the adrenaline-producing revs that follow. Even in 1/4-scale this sound is totally unmistakable. Other than glowplugs and some oil in the fuel, the miniature operates just as the full-size one.

Inside the supercharger is a vane-style pump design. Presently there is no information on the amount of boost which it supplies. I also installed roller rocker arms. These are a bore of .625 and a stroke of .625, which gives a total displacement of 1.53 cubic inches. Five main ball bearings support the crankshaft, which is pressed together in sections, dial indicated, and pinned. Each piston has one compression ring, which allows enough blow-by to lubricate all rod and main bearings. The rods, as with all other parts of the engine, are machined from bar stock. The rods are 2024 T6, while all other aluminum parts are 6061 T6. There is a compression ratio of 10.5 to 1. This little 8-cylinder gem produces approximately 2.5 horsepower at 12,000 rpm. The water pump is located where a generator would fit on a full-size motor.

Currently the car will run approximately 35 to 40 miles per hour. Times that by 4, as it's 1/4-scale, and what do you get—140 to 160 mph. Okay, where's the dry lake bed?

If you're interested in machining your own engine, in the future I plan to offer the engine as a casting kit. Please send your name and address to G.L. Conley Engineering, 825 Duane, Glen Ellyn, IL 60137, and your name will be added to a mailing list. Keep in mind that the car described here is *one of a kind* and is not available. The last offer I had was \$20,000. Do I hear \$30,000? Maybe I'll throw in a surfboard and a Barbie doll.

I would like to express my special thanks to pretty Sandy Simon of Burlington, Wisconsin, who I literally whisked out of her job and on to the beach for the photos. Sandy is a student at Wilmot High School in Wilmot, Wisconsin. Also deserving of thanks are Gene and Cathy Huber, owners of the Sandbar Resort Marina on Lake Marie in Antioch, Illinois. ■

MRC ROAD WIZARD

(Continued from page 38)

power supply, DC 12V; dimensions, 227x168x85 mm; weight, 410 g (without batteries).

Receiver ARC-275—intermediate frequency, 455 KHz; power supply, DC 4.8V-6V; dimensions, 50x36x21 mm; weight, 38 g.

Servo AS-7—torque, 3.0 kg/cm or more; speed, 0.28 sec/60°; dimensions, 42x40x20 mm; weight, 50 g.

Some of the features include servo reversing, steering dual rate, steering servo travel adjustment, steering trim, and pistol-grip reversing. Controls can be seen on the accompanying transmitter control diagram.

If you follow the instructions and diagrams on installing the radio, you won't have any problems. Both steering adjustments and speed controller adjustments are clearly illustrated. With the radio installed and checked out, I could finish the car.

As I mentioned, two Lexan bodies are provided, so if I had any problems with the first body I had a spare. I had to cut the body to the outline shown in the instructions, and I used a combination of scissors and an X-Acto knife; scissors for the corners and the X-Acto with a No. 11 blade for the straight line cuts. I scribed a straight line run with a straightedge and an X-Acto knife, then pressed the clear plastic away from the scribed side and it broke on the line. Try this technique on some scrap section of the body and you'll get the hang of it.

Next came prepping the cutout Lexan parts for painting, and I washed them thoroughly in detergent soap to remove all mold release. Polycarbonate paint is recommended for painting the body and should be brushed or sprayed on the inside. In the case of the John Player Special, only one color was required, black, and I brushed it on. It turned out beautifully! The only other painting necessary was the driver. I chose to continue the black and gold color scheme of the car, but painted the driver with enamel paint on the outside of the body.

The decals are another matter and great care must be used when placing them in position. The J.P.S. is actually the fifth car body I've striped, but none of the predecessors required as much care. I would have felt much better if I'd had two sets of J.P.S. decals, but I didn't so I had to be very careful. I've found that the Tamiya "sticky" decals are manageable if you take certain precautions. First, never remove all of the

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Car Action!

MRC ROAD WIZARD

decal backing unless it's a very small decal which you can place with the tip of an X-Acto knife or a toothpick. The J.P.S. model has a lot of pin striping, which I applied by removing about an inch of backing at a time. The same was also true of the "J.P.S." and "Renault Elf" decals. If you take the complete decal backing off, you'll find that the decal sticks to your fingers and is almost impossible to place properly.

I've probably enjoyed this car review as much as any I've done for *Radio*

Control Car Action because of the car body style (although the MRC/Tamiya 956 Porsche runs a close second). Personally, I'd like to see MRC/Tamiya come out with an Indy car, a March, or a Lola sometime in the future. If you haven't built an R/C car yet, try it, you'll like it.

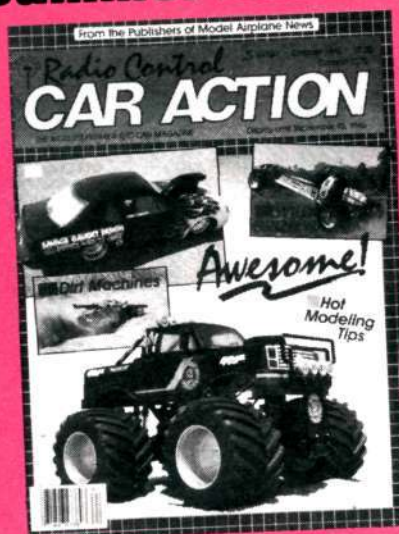
*The following are the addresses of the companies mentioned in this article:

MRC/Tamiya, Model Rectifier Corporation, 2500 Woodbridge Ave., Edison, NJ 08817.

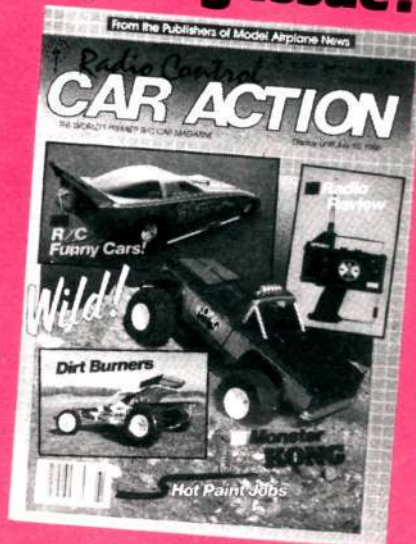
Altech Marketing Inc., P.O. Box 286, Fords, NJ 08863.

Missing Your...

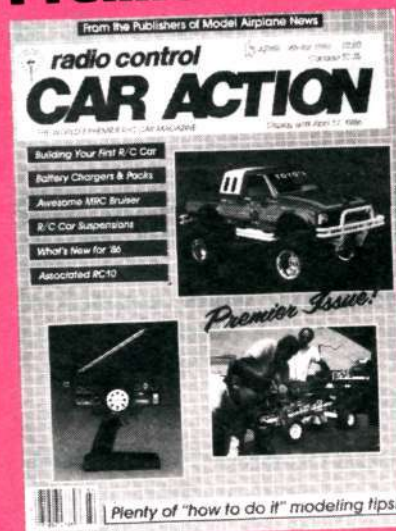
Summer Issue?



Spring Issue?



Premier Issue?



Send \$3 each (check or M.O.) to
Radio Control Car Action, 632
Danbury Rd., Wilton, CT 06897.

☐ Premier Issue ☐ Spring Issue
☐ Summer Issue

Amount enclosed \$ _____

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